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Cross-border renewable PPAs in Europe:

An overview for corporate buyers

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RE-Source
European platform for corporate renewable energy sourcing

Contents

List of acronyms

AIB	Association of Issuing Bodies
CDP	Carbon Disclosure Project
EAC	energy attribute certificate
EECS	European Energy Certification System
EU ETS	European Union Emissions Trading Scheme
FTR	financial transmission right
GHG	greenhouse gas
GO	guarantee of origin
IFRS	International Financial Reporting Standards
LCOE	levelized cost of electricity
NGO	non-governmental organization
PPA	power purchase agreement
PTR	physical transmission right
RED	Renewable Energy Directive
SDAC	single day-ahead coupling
TSO	transmission system operator
WBCSD	World Business Council for Sustainable Development
XB PPA	cross-border power purchase agreement

Executive summary

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Interest in corporate renewable power purchase agreements (PPAs) has grown exponentially in recent years. A corporate renewable PPA is a contract between the corporate buyer(s) and the power producer (developer, independent power producer, investor) to purchase renewable electricity at a pre-agreed price for a pre-agreed period of time.[1]

This report examines a specific offsite PPA structure emerging in the European Single Market: the **cross-border PPA (XB PPA)**. In a XB PPA, a corporate buyer purchases renewable electricity (and usually the accompanying guarantees of origin – GOs) generated outside the electricity market[2] of their electricity load, via a PPA. XB PPAs can take two forms: virtual/financial XB PPAs, which are growing in popularity for pan-European renewable electricity sourcing, and physical/direct XB PPAs, of which there are currently no known examples in Europe using the definition described in this report.

The objective of this report is to help corporate buyers understand the technicalities of XB PPAs by providing a balanced view of the risks and opportunities that the XB PPA structure can provide.

This report only addresses XB PPAs. Previous WBCSD reports detail the structures, benefits and risks that are applicable to non-XB PPAs (in-market PPAs) such as Corporate Renewable Power Purchase Agreements: Scaling up globally and *Innovation in Power Purchase Agreement Structures*, as does the RE-Source report on *Risk Mitigation for Corporate Renewable PPAs*.

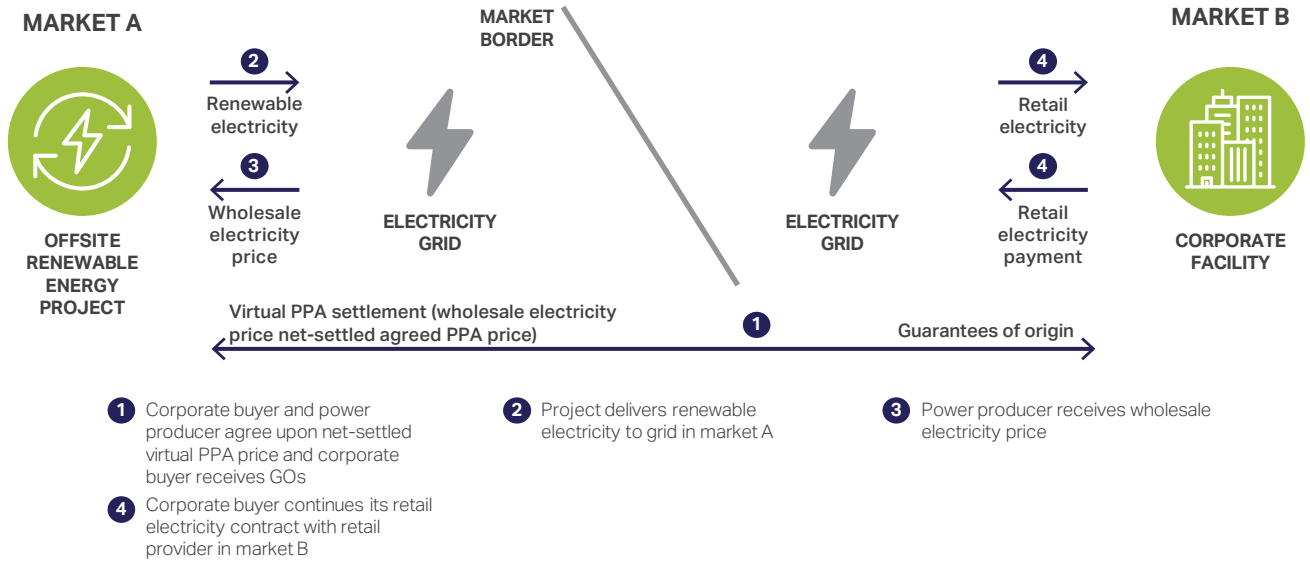
[1] For more information, please see previous WBCSD reports on corporate renewable PPAs: Corporate Renewable Power Purchase Agreements: Scaling up globally (October 2016), Innovation in Power Purchase Agreement Structures (March 2018) and How Multi-Technology PPA Structures Could Help Companies Reduce Risk (March 2019). These publications cover opportunities offered by corporate renewable PPAs, obstacles faced by corporate buyers and developers, and innovations in corporate renewable PPAs that are emerging as the market grows and evolves.

[2] Companies procure electricity at the *country* or *electricity market (e.g. zonal)* level, depending on their location. Throughout this report we use the term "market" for consistency.

In the **virtual XB PPA** model, the power producer sells the generated electricity in the wholesale power market where the generation asset is located (market A). The payments received by the power producer from the fluctuating wholesale power price in market A are net-settled[3] against the PPA price agreed with the corporate buyer. The corporate buyer continues to purchase electricity for its facilities under its local contracts in the market where the load is located (market B). As the virtual XB PPA contract is a financial settlement, a physical network connection between the generation asset(s) and the load is not necessary.

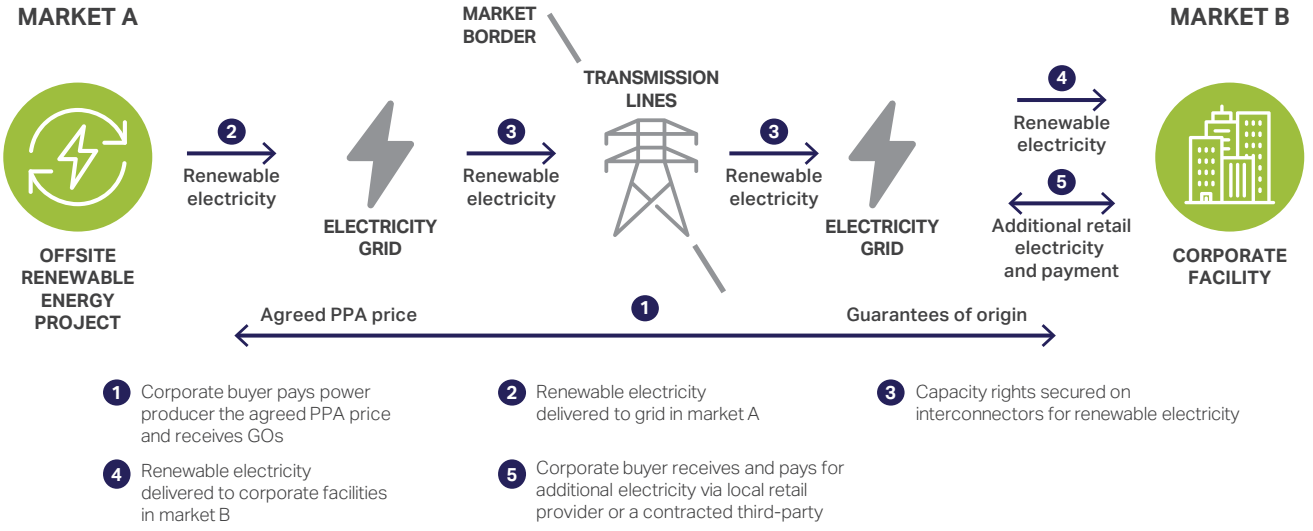
In the **physical XB PPA** model, there is a physical network connection between the generation asset in market A and the load of the corporate buyer in market B. The generated electricity is nominated with the system and/or market operator for delivery to the corporate buyer's point of consumption via the electricity network and interconnector. As physical XB PPAs by this definition rely on electricity trading across market borders on so-called interconnectors, it is important to understand this process to be able to evaluate its practicality for a physical XB PPA and to understand why the physical XB PPA structure – using the definition in this report – presents considerable uncertainty and risk.

Figure 1: Virtual cross-border PPA



Note on step 1: basis risk may either be allocated to the corporate buyer (if the PPA price is net-settled against the wholesale electricity price in the market where the generation asset is located, market A) or to the power producer (if the PPA price is net-settled against the wholesale electricity price in the market where the load is located, market B). We include more detail on the definition and allocation of basis risk in 'Risk considerations specific to XB PPAs'.

Figure 2: Physical cross-border PPA



[3] We use the term *net*-settled to clarify that each party in the agreement is subject to gains or losses depending on the outcome of the difference between the wholesale power price and the agreed upon PPA price.

XB PPAs may provide corporate buyers with additional benefits compared to in-market PPAs, including the ability to:

- Overcome regulatory barriers in and between the markets where their facilities are located
- Choose projects with the most favorable terms irrespective of their location and/or use a multi-technology approach in multiple geographies where beneficial; and
- Aggregate electricity load in several markets and streamline electricity and GO sourcing.

However, XB PPA sourcing and contracting can be complex and it is important that corporate buyers fully understand the risks and complexities before entering into a contract of this type, including but not limited to:

- Virtual XB PPAs are susceptible to increased basis risk and can trigger derivative accounting under International Financial Reporting Standards (IFRS) accounting treatment.
- Physical XB PPAs with cross-border electricity trading (as defined in this report) are significantly hindered by the uncertainty of obtaining interconnector capacity rights for the duration of the PPA and by the accompanying cross-border transmission price risk.
- Corporate buyers must adhere to market boundary guidance issued by reporting bodies, in order to make credible environmental claims associated with a XB PPA.
- There is an increased need for a thorough and robust due diligence process due to added sourcing and contracting complexity.

Despite the complexities, as renewable electricity markets in Europe continue to grow and mature, more and more companies may favor the XB PPA model for its upsides. With a supportive enabling environment, XB PPAs have the potential to make a material contribution to additional renewable electricity deployment in Europe.

1 Introduction

1 Introduction

Interest in corporate renewable power purchase agreements (PPAs) has grown exponentially in recent years. Corporate renewable PPAs enable corporate buyers to manage their electricity costs and increase cost visibility, while simultaneously making progress on carbon reduction and environmental goals. Cross-border PPAs are the latest structural variation to emerge and are fast gaining popularity among corporate buyers looking to source renewable power across Europe.

A **corporate renewable PPA** is a contract between the corporate buyer(s) and the power producer (developer, independent power producer, investor) to purchase renewable electricity at a pre-agreed price for a pre-agreed period of time.[4] The contract contains the commercial terms of the electricity sale: contract length, point of delivery, delivery date/times, volume, price and product. The electricity sold under a PPA can be from an existing renewable electricity supply or a new-build project. A PPA typically also includes the sale of the associated energy attribute certificates (EACs), commonly known as guarantees of origin (GOs) in the European Single Market[5].

This report examines a specific offsite PPA structure emerging in the European Single Market: the **cross-border PPA (XB PPA)**. In a XB PPA, a corporate buyer purchases renewable electricity (and usually the accompanying GOs) generated outside the electricity market[6] of their electricity load, via a PPA. XB PPAs can take two forms: virtual/financial XB PPAs, which are growing in popularity for pan-European renewable electricity sourcing, and physical/direct XB PPAs, of which there are currently no known examples in Europe – using the definition described in this report.

The reasons for growing interest in XB PPAs are manifold. XB PPAs can offer greater flexibility to the corporate buyer, who can choose the most favorable project conditions unrestricted by location. In addition, XB PPAs are growing in familiarity and legitimacy in Europe as European electricity markets are becoming ever more interconnected – physically and commercially[7] – and Europe is considered a single market for carbon emissions under the European Union Emissions Trading Scheme (EU ETS).

[4] For more information, please see previous WBCSD reports on corporate renewable PPAs: Corporate Renewable Power Purchase Agreements: Scaling up globally (October 2016), Innovation in Power Purchase Agreement Structures (March 2018) and How Multi-Technology PPA Structures Could Help Companies Reduce Risk (March 2019). These publications cover opportunities offered by corporate renewable PPAs, obstacles faced by corporate buyers and developers, and innovations in corporate renewable PPAs that are emerging as the market grows and evolves.

[5] Throughout the report, we refer to European energy attribute certificates as GOs. GOs are defined in EU legislation (article 15 of the European Directive 2009/28/EC) and applied in the European Single Market (EU Member States plus the European Economic Area states of Iceland, Lichtenstein and Norway).

[6] Companies procure electricity at the *country* or electricity market (e.g. zonal) level, depending on their location. Throughout this report we use the term "market" for consistency.

[7] 19 European countries are currently part of the Multi-Regional Coupling (MRC) and the European Union plans to continue to add markets to eventually create a single pan-European electricity market.

There is also increasing interest in XB PPA structures at the government level: a 2019 publication by the European Commission on the competitiveness of corporate sourcing of renewable energy explicitly called XB PPAs "important element[s] for expanding the contribution of corporate renewable energy PPAs to Europe's energy transition…allow[ing] renewable energy to be purchased from where it is cheapest and delivered to centres of consumption." This reasoning points to additional system efficiencies, as XB PPAs can enable renewable electricity generation in locations in Europe where it is possible to produce it most efficiently, meaning in markets where the load factors for renewable technologies such as solar or wind are highest. As experience develops and markets mature, XB PPAs may be applicable in other geographies too, such as Asia.

However, XB PPAs also require careful consideration as they inherently introduce new risks into the PPA compared to in-market PPA structures. The objective of this report is to help corporate buyers understand the technicalities of XB PPAs by providing a balanced view of the risks and opportunities that the XB PPA structure can provide.

The first and second chapters of this report examine the drivers behind XB PPAs and the differences between virtual and physical XB PPA models. The third chapter addresses risk considerations specific to XB PPAs, delving into the details of the importance of understanding the impact of basis risk on the economics of virtual XB PPAs, and why cross-border trading rules have been prohibitive for physical XB PPA structures in Europe to date. The fourth chapter considers the important implications of market boundary definitions for GO treatment and disclosure, and the fifth chapter concludes the report with guidance on effective internal and external communications for XB PPAs in Europe.

This report only addresses XB PPAs. Previous WBCSD reports detail the structures, benefits and risks that are applicable to non-XB PPAs (in-market PPAs) such as Corporate Renewable Power Purchase Agreements: Scaling up globally and Innovation in Power Purchase Agreement Structures, as does the RE-Source report on Risk Mitigation for Corporate Renewable PPAs.

2 XB PPA drivers and benefits

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The main drivers for corporate buyers to procure electricity via renewable PPAs are economics, sustainability, brand reputation and leadership (for more details, see WBCSD's *Corporate Renewable Power Purchase Agreements: Scaling up globally* report). The XB PPA structure can offer the added advantage of contracting a project with the most beneficial economics – regardless of geography.

XB PPAs offer geographical flexibility to the corporate buyer, irrespective of the location of their load(s), when:

1. Corporate renewable PPAs are not available in the market where the load is located due to the regulatory framework;
2. Corporate renewable PPAs are available in the market where the load is located but are cost prohibitive or otherwise constrained; or
3. The corporate buyer can extract a higher value (such as lower cost, lower risk or higher environmental impact) by procuring renewable electricity in a different market.

Table 1 describes the specific benefits of XB PPAs, beyond the benefits already offered by in-market PPAs.

"Maximizing impact was our key driver for selecting a cross-border structure – it allows us to contribute to the build-out of new solar power plants by aggregating demand from many countries under a single PPA."
Moritz Bernhoerster, Director Global Procurement, AB InBev

"By choosing a virtual cross-border PPA structure, we were able to combine our electricity load across several markets and contribute to the development of additional solar and wind capacity, which we wouldn't have been able to do in individual countries"
Sim van der Linde, Project Director Renewable Energy, Royal DSM

Table 1: Potential benefits of XB PPAs for corporate buyers

POTENTIAL BENEFIT	DESCRIPTION
Ability to bypass regulatory barriers in the market where the load is located	Corporate buyers can source renewable electricity for their facilities even if the regulatory framework in their local market is prohibitive.
Ability to choose projects with the most favorable terms	Corporate buyers can source renewable electricity from projects in locations with the most beneficial terms. These can relate to price, as a higher spread between the wholesale electricity price and levelized cost of electricity (LCOE) may enable the corporate buyer to negotiate a proportionally lower PPA price than in their load market.* For example, projects with high load factors (i.e., steady wind speeds or high solar radiation resulting in a high electricity production), low labor costs and low material costs allow for electricity production at the lowest unit cost, giving a low LCOE for the project. This has the added system benefit of encouraging the development of renewables in the locations best suited to those technologies. Favorable terms may also relate to risk management, e.g., when the corporate buyer is looking for a certain price structure that improves the ability to manage for or hedge against risks.
Ability to use a multi-technology approach	Corporate buyers can source renewable electricity from multiple locations, using the most efficient technology for the conditions in each location, i.e. a solar project in one market and a wind project in another market, to form a firmer electricity generation profile that better matches the corporate buyer's electricity demand profile.[8]
Ability to aggregate electricity load from several markets and streamline electricity and GO sourcing	Corporate buyers can combine their electricity load from multiple markets under the umbrella of one or more XB PPA(s). This allows corporate buyers to execute large-scale pan-European procurement of renewable electricity and GOs, which it can apply across its operational footprint. By aggregating the procurement of power and GOs from several markets into one or more XB PPAs, it is possible to reduce the number of overlapping contracts for electricity purchasing and associated fees. Aggregating electricity load may also have the added benefit of expediting the construction of new renewable electricity projects, e.g. when the corporate buyer faces planning bottlenecks in the market where the load is located.
Ability to supply leased facilities with renewable electricity	When using a virtual XB PPA model, the PPA can cover the total load of a corporate buyer's facilities, including those owned or leased, and the corporate buyer may be able to change the location of this load without renegotiating contracts.
Improved leadership opportunity	XB PPAs provide the flexibility to seek projects that can derive the most positive environmental impact – if desired – such as those located in more carbon-intensive electricity markets. These types of leadership actions may align with company objectives and may positively impact a company's brand and reputation.

* NB: For a virtual XB PPA structure, it is necessary to weigh the economic upside against the additional cost of managing basis risk (see 'Implications of basis risk for virtual XB PPAs'). For a physical XB PPA structure, the costs and risks of transmitting power between the markets may negate the economic upside (see 'Implications of cross-border power transmission for physical XB PPAs'). The next chapter provides further explanation on the differences between virtual and physical XB PPA structures.

[8] For further analysis of multi-technology PPAs and their impact on shape, volume and imbalance risk, see the WBCSD report How multi-technology PPAs could help companies reduce risk (March 2019)

3 Differences between virtual and physical XB PPA models

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Generally, XB PPAs can be structured either as a virtual or financial PPA (virtual PPA) or as a direct or physical PPA (physical PPA). Before evaluating these two XB PPA models, here is a short reminder of in-market virtual and physical PPAs:

- In the virtual PPA model, the power producer sells the generated electricity into the wholesale power market. The payments received by the power producer from the fluctuating wholesale power price are net-settled[9] against the PPA price agreed with the corporate buyer. The corporate buyer continues to purchase electricity for its facilities under its local contracts. As the virtual PPA contract is a financial settlement, a physical network connection between the generation asset(s) and the load is not necessary.
- In the physical PPA model, there is a physical network connection between the generation asset and the load of the corporate buyer. The generated electricity is nominated with the system and/or market operator to be delivered to the corporate buyer's point of consumption via the electricity network. This allows for direct delivery of power from the power producer to the corporate buyer. The corporate buyer usually purchases any additional power needed to serve the remainder of the load via its existing retail electricity provider or a third-party.

For both structures, the power producer typically sells the associated GOs alongside the PPA to enable corporate buyers to evidence that each MWh that they have purchased through the project is renewable.

Both virtual and physical PPA structures can offer "additionality", where the renewable electricity would not have been produced *but for* the corporate renewable PPA.[10] European companies may be most familiar with the physical PPA model, since many are accustomed to purchasing electricity under a physical PPA structure, while U.S. or Australia-based companies with European loads may be more familiar with the virtual PPA model, as this is commonly used in the U.S. and Australia.

We explain the differences between a **cross-border** virtual PPA and **cross-border** physical PPA in the following two subsections.

[9] We use the term *net*-settled to clarify that each party in the agreement is subject to gains or losses depending on the outcome of the difference between the wholesale power price and the agreed upon PPA price.

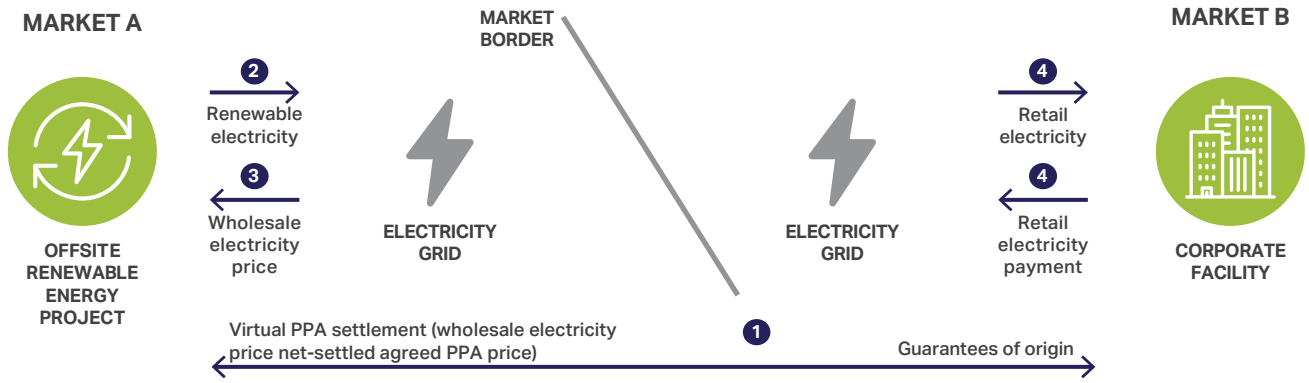
[10] For more information on additionality, see WBCSD report Corporate Renewable Power Purchase Agreements: Scaling up globally

VIRTUAL XB PPAS

Virtual PPAs are structurally accommodating to the XB PPA model. This is because the virtual PPA separates two prices by design: (1) the wholesale electricity price against which the agreed PPA price is net-settled; and (2) the existing retail electricity contract at the corporate buyer's facility. The upside is that the corporate buyer does not need to alter existing retail electricity contracts in the market where the load is located. However, virtual XB PPAs are susceptible to increased basis risk and virtual PPAs can trigger derivative accounting under IFRS accounting treatment as previously detailed in the IFRS accounting outline for Power Purchase Agreements report. We provide further commentary on these two aspects in 'Risk considerations specific to XB PPAs'.

Figure 1 below shows a typical virtual XB PPA structure.

Figure 1: Virtual cross-border PPA



1. Corporate buyer and power producer agree upon net-settled virtual PPA price and corporate buyer receives GOs
2. Project delivers renewable electricity to grid in market A
3. Power producer receives wholesale electricity price
4. Corporate buyer continues its retail electricity contract with retail provider in market B

Note on step 1: basis risk may either be allocated to the corporate buyer (if the PPA price is net-settled against the wholesale electricity price in the market where the generation asset is located, market A) or to the power producer (if the PPA price is net-settled against the wholesale electricity price in the market where the load is located, market B). We include more detail on the definition and allocation of basis risk in 'Risk considerations specific to XB PPAs'.

CASE STUDY: Virtual cross-border PPA helps Novartis become both energy and climate-resilient

Structure: Virtual cross-border PPA

Generation market: Spain

Offtake markets: Austria, Germany, Spain, France, United Kingdom, Italy, Sweden, Romania, Switzerland, Belgium, Slovenia, Poland, Czech Republic, Ireland

Power producer: Enel Green Power

Capacity: 78.5 MW

Technology: Wind

Tenor: 10 years

Novartis, the global medicines company, has set ambitious sustainability targets to be carbon neutral in its own operations by 2025 in accordance with the Science-Based Targets Initiative criteria. As part of this effort, in November 2020, Novartis announced a set of virtual cross-border PPAs for more than 275 MW of renewable power. With these deals, Novartis is on track to achieve 100% renewable electricity in its European operations.

One of the virtual cross-border PPAs was signed with Enel Green Power, with support from Schneider Electric, through a 78.5 MW portion of the Tico wind farm in Spain. This 10-year deal will generate guarantees of origin (GOs) for Novartis and the associated claims will be applied on a pan-European basis.

Choosing a virtual cross-border PPA structure was the result of a trade-off analysis between sourcing and contracting complexity versus flexibility and carbon impact. One of the key considerations in the Novartis renewable energy strategy was its fluid European footprint which is comprised of numerous locations with different energy needs. The virtual cross-border PPA not only allows the aggregation of demand from multiple countries but also provides flexibility in the event of any changes in the size or location of the company's facilities.

By procuring electricity from the Spanish wind project, Novartis is leveraging one of the highest onshore wind load factors in Europe. This is in turn reflected in the lower levelized cost of energy and more cost-effective renewable electricity production.

KEY LEARNINGS:

"This portfolio of virtual PPA deals that we have recently announced has allowed us to make significant progress towards our carbon neutrality goals during a period of significant business transformation activity. The flexibility offered by utilizing the virtual cross-border PPA structure was integral in defining our renewable energy strategy. The other important factor in the decision-making process was the GO treatment. The clear definition of a market boundary in Europe allows Novartis to make evidenced carbon reduction claims from renewable electricity procured through this virtual cross-border PPA."

Mark Scoffin, Head of Procurement – Utilities, Novartis

PHYSICAL XB PPAS

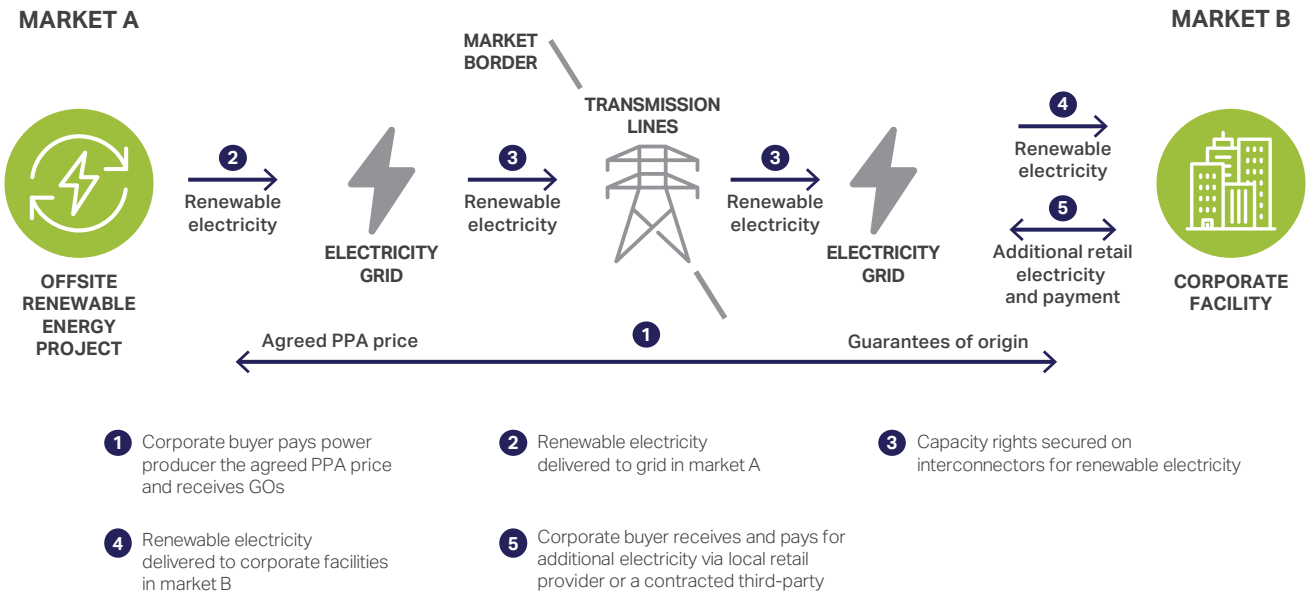
It is also theoretically possible to structure XB PPAs as a physical PPA. In general, physical PPAs are attractive for corporate buyers because they do not create derivative accounting concerns under IFRS[11] and allow for the delivery of power via the system/market operator to the load location(s). Figure 2 below shows a theoretical physical XB PPA structure.

As physical XB PPAs by this definition rely on electricity trading across market borders on so-called interconnectors, it is important to understand this process to be able to evaluate its practicality for a physical XB PPA. Readers who are not familiar with cross-border electricity trading and the use of physical transmission rights (PTRs) and financial transmission rights (FTRs) in Europe, can find an explanation in the Annex: Process of power trading on interconnectors in Europe.

When using an interconnector to physically flow electricity from one market to another for a physical XB PPA, complexities arise from a mismatch between the purpose of the existing rules of cross-border power trading on interconnectors and long-term PPAs: interconnector capacity rights (i.e. PTRs and FTRs) are predominantly used as financial contracts to enable efficient trading of power over the interconnector and are not designed for the purpose of physically delivering power for an individual long-term PPA aiming for price visibility.

The rules of trading power on interconnectors create two main risks for physical XB PPAs, firstly obtaining interconnector capacity rights for the duration of the XB PPA and secondly managing the price risk that arises from the auctioning of interconnector capacity rights and from the price spread between all markets concerned. Another relevant issue is the small number of true pan-European energy suppliers that would manage the delivery of electricity across borders to the corporate buyer's various facilities. We provide more explanation on these risks in 'Implications of cross-border power transmission for physical XB PPAs'.

Figure 2: Physical cross-border PPA



[11] Unless hedging mechanisms are deployed to manage certain risks. See further information under 'Accounting Implications' in 'Sourcing and contracting complexity'.

4 Risk considerations specific to XB PPAs

4 Risk considerations specific to XB PPAs

The drivers and potential benefits of XB PPAs outlined at the start of this report show the significant upsides a XB PPA can offer. However, XB PPAs equally carry specific risks that corporate buyers should fully understand before entering into a contract of this type.

This chapter describes market and policy-related risks and contracting complexity that specifically result from XB PPAs. These are *in addition to* the risks that in-market PPAs already contain and allocate between parties.

MARKET AND POLICY-RELATED RISKS

While it is necessary to choose and structure PPAs in a manner that provides economic and environmental upsides to both parties, all parties should carefully scrutinize the downside risks stemming from market movements and policy changes.

Three key risks affect a XB PPA in a different manner to an in-market PPA: basis risk, price risk and change in law risk. The fact that the parties contract the PPA across different electricity markets does not directly impact development risk, performance risk, balancing risk, volume risk, profile risk and force majeure risk; we therefore do not address them in this report.

However, for both XB and in-market PPAs, it is always necessary to evaluate *all* risks for each company, counterparty, third-parties, lenders and markets concerned. For a definition of all risks associated with corporate renewable PPAs, refer to Table 2 in WBCSD's Innovation in Power Purchase Agreement Structures report.

Table 2 outlines the three risks that have a different impact for XB PPAs and highlights the issues specific to virtual and physical XB PPA structures respectively. As the implications of basis risk for virtual XB PPAs and cross-border power transmission for physical XB PPAs are complex and require more explanation, we address these in more detail following Table 2.

Table 2: Market and policy-related risks with particular impacts for XB PPAs

RISK TYPE	WHAT IT MEANS FOR XB PPAS	SPECIFICITIES FOR VIRTUAL XB PPAS	SPECIFICITIES FOR PHYSICAL XB PPAS[12]
Basis risk	A primary consideration for a XB PPA is the price correlation between the market(s) where the generation asset is located and the market(s) where the load is located. If the relevant prices do not move in tandem, this will lead to the (virtual) PPA providing an imperfect hedge for the corporate buyer (assuming the power producer sells the generated power into the market of asset location) – and thus continued exposure to price volatility (see 'Implications of basis risk'). Variations in currency between markets (e.g. GBP to EUR) may exacerbate this risk.	Basis risk is inherent to a virtual XB PPA as the wholesale electricity prices in the market(s) where the assets are located may not correlate with the wholesale price in the market(s) where the load is located. The allocation of basis risk to the corporate buyer or power producer (depending on which market the PPA payments are net-settled against) will be a key negotiation point. Further detail on virtual XB PPA basis risk allocation and mitigation options is available in 'Implications of basis risk for virtual XB PPAs'.	Basis risk does not usually apply to a physical XB PPA itself, as the price payable is the agreed price for the electricity rather than a net price determined by reference to a market price. However, if variable price structures are included to hedge part or all the volume of a physical XB PPA, then basis risk would be relevant.
Price risk	Price risk for XB PPAs results from changes in the various drivers that impact electricity prices in the markets of asset location and/or load location(s). For example, changes in the energy mix over time can drive price risk. A reduction in fossil fuel generation and/or an increase in renewable generation over time has the potential to negatively affect XB PPA pricing by leading to lower wholesale power prices, particularly when interconnector capacity to neighboring markets is limited.	Lower wholesale power prices in the market(s) of the generation asset location are a risk in a virtual XB PPA (assuming that the corporate buyer is bearing the basis risk and has not mitigated that risk) because the net-settlement between the wholesale power price in the market of the asset location and the agreed PPA price can result in the corporate buyer paying the difference versus that lower wholesale power price while still paying higher wholesale power prices in the market(s) of their load location.	Lower wholesale power prices and the resulting additional export of power to neighboring markets with higher wholesale prices would lead to a wider market spread and an increase in the price of interconnection capacity rights for physical XB PPAs (if not hedged appropriately). Price risk resulting from interconnector capacity auctions applies to physical XB PPAs only; see further details in 'Implications of cross-border power transmission for physical XB PPAs'.
Change in law risk	Policies or regulations may change in each market over the course of the PPA tenor, affecting the operational management and financial performance of the XB PPA. In addition to the market(s) of the generation asset location and market(s) of load location, it is necessary to consider all intervening transmission markets.	Where a virtual XB PPA is priced by reference to the market where the asset is located, the primary change in law risk is in that of the wholesale electricity market of asset location. This may include changes to policy and regulation. Dealing with this under a virtual XB PPA will depend on the negotiation of its terms.	Changes in policy, regulation, transmission and interconnector rules all have the potential to affect physical XB PPAs. This may include changes to taxes or market design. Dealing with this under a physical XB PPA will depend on the negotiation of its terms (for example, in what circumstances such changes will enable a discussion on economic impacts).

[12] The physical XB PPA structure – using the definition in this report – presents considerable uncertainty and risk and there are therefore no known examples in Europe today (see an explanation in 'Implications of cross-border power transmission for physical XB PPAs'). For completeness, and as innovative approaches to physical XB PPAs may be developed in the future, we have provided commentary on physical XB PPAs in this table in addition to the more established virtual XB PPA structure.

IMPLICATIONS OF BASIS RISK FOR VIRTUAL XB PPAS

ALLOCATING BASIS RISK

Virtual XB PPAs require the contracting parties to agree on the allocation of basis risk. The agreed PPA price is net-settled against the price the generator receives when selling the produced power into the wholesale market. Basis risk is the potential lack of correlation between the price in the wholesale market where the asset is located and the price in the wholesale market where the load is located.[13] The corporate buyer would bear the basis risk in a virtual XB PPA when the agreed PPA price is net-settled against the wholesale price in the market where the electricity is produced, not in the market where the corporate buyer's load is located[14]. If the wholesale prices in each of these markets do not move in tandem, this will lead to the virtual PPA providing an imperfect hedge for the corporate buyer – and thus continued exposure to volatility in power purchasing.[15]

Therefore, assuming the corporate buyer bears the basis risk, it will need to evaluate the price correlations between wholesale electricity prices in the market(s) where the electricity is generated and in the market(s) where the load is located (and potentially account for currency differences). If the virtual XB PPA is covering load in multiple markets, the analysis of price correlations must compare the wholesale electricity price in the market where the electricity is generated to the wholesale electricity prices in each market where load is located. Price differences will change over the duration of the PPA, driven by several factors, such as wholesale electricity price reductions due to increased renewable electricity generation, or the retiring of coal and nuclear assets.

MITIGATING THE IMPACT OF BASIS RISK

Where a corporate buyer is primarily liable for basis risk, it can seek to mitigate the impact of that risk by using different pricing structures and dedicated hedging strategies.

An example of the former would be to not accept the entirety of the risk by using a "cap and floor" virtual PPA. This would reduce the impact of basis risk for a corporate buyer by limiting the range across which the net-settled PPA price can fluctuate. This so-called "collar" comprises the maximum (cap) and minimum (floor) price payable. This, however, does mean that the power producer will bear some of the impact of the basis risk (whenever the net-settled PPA price is outside the collar range) and therefore will be relevant to lender-assessment of the project.

Another strategy would involve a corporate buyer accepting basis risk but then looking to mitigate the impact via a hedging strategy, for example by paying a wholesale market trader to take on the basis risk. Currently there is limited availability of such products in European markets and where hedging products are available, they will usually be for short tenors (e.g., 1-2 years). Some power producers with strength in both the development of renewable electricity projects and electricity trading may be able to internalize the risk for a premium.

A further example of a hedging strategy (used predominantly in the United States) is a "fixed-volume swap", which can significantly reduce the impact of basis risk for the corporate buyer. Under a fixed-volume swap, in any given hour the hedge provider takes the variable net-settled price and pays a fixed price to the corporate buyer, for a fixed volume of power as agreed between the two parties. As this structure is based on a fixed-volume commitment, the corporate buyer is responsible for managing the resulting shape and volume risk.[16]

Risk mitigation strategies – particularly those managed by a third-party or the power producer – come with additional costs. It is therefore important to weigh the additional costs against the economic upside that a virtual XB PPA may provide to evaluate the overall economic viability of the commercial pricing terms of the PPA.

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[13] It is important to note that there are slight variations in the current definitions of basis risk used by different market actors. Some actors use different naming convention (e.g. basis risk for developers, but hedge risk for corporate buyers). Others are including the price differential between the wholesale and retail prices in the market where the load is located within the basis risk definition. It is therefore essential to ensure that all contracting parties use a common definition to avoid misunderstanding.

[14] Alternatively, the agreed PPA price can be net-settled against the wholesale price in the market where the corporate buyer's load is located. In this instance, the developer is taking on the basis risk. To date it has been more common for basis risk to be borne by the corporate buyer.

[15] As price convergence increases across markets in Europe, basis risk decreases for XB PPAs. An increase in market coupling and an expansion of interconnector capacity in Europe will drive greater price convergence across markets.

[16] For further information on fixed-volume swaps and their impact on risk, please see: The "P99 hedge" that wasn't (May 2019)

IMPLICATIONS OF CROSS-BORDER POWER TRANSMISSION FOR PHYSICAL XB PPAS

When using an interconnector to physically flow electricity from one market to another for a physical XB PPA, complexities arise from a mismatch between the purpose of the existing rules of cross-border power trading on interconnectors and the purpose of long-term PPAs: interconnector capacity rights (i.e. PTRs and FTRs) are predominantly used as financial contracts to enable efficient trading of power over the interconnector and are not designed for the purpose of physically delivering power for an individual long-term PPA contract aiming for price visibility. This creates two main risks for the party responsible for trading power over the interconnector for a physical XB PPAs: (1) obtaining interconnector capacity rights for the duration of the XB PPA; and (2) managing the price risk that arises from the auctioning of interconnector capacity rights and from the price spread between all markets concerned. Both are explained in more detail in this section to outline why the physical XB PPA structure – using the definition in this report – presents uncertainty and risk.

Readers who are not familiar with cross-border electricity trading and the use of physical transmission rights (PTRs) and financial transmission rights (FTRs) in Europe can find an explanation in the Annex: Process of power trading on interconnectors in Europe.

OBTAINING INTERCONNECTOR CAPACITY RIGHTS FOR THE DURATION OF THE XB PPA

As explained in 'Annex: Process of power trading on interconnectors in Europe', the ability to purchase interconnector capacity rights in auctions in Europe is commonly limited to one year and therefore mismatches the typical tenor of 10-15-year PPAs. Even if the responsible party[17] is successfully awarded annual capacity rights for the first year of a 15-year physical XB PPA, it would need to participate in 14 additional annual auctions throughout the PPA's lifetime. This adds a high degree of uncertainty to the PPA, both in terms of whether the capacity rights will be awarded each year (i.e., if the bid is high enough) and the change in auction prices for those capacity rights over time.

If the responsible party does not receive annual capacity rights for any one year, it can instead participate in monthly or daily auctions, though this may reduce the probability of receiving capacity rights for the full year in question, increase workload and reduce price visibility.

To reduce the uncertainty of obtaining interconnector capacity rights for the duration of the PPA contract, some market players are advocating for interconnector capacity auctions that enable the purchase of capacity rights further into the future, such as 5-, 10- or 15-year auctions. Even if it were possible to purchase capacity rights on a 5-, 10- or 15-year basis, it would not be possible to accurately forecast the market price spread for such tenors and the responsible party would likely be unwilling to shoulder the significant risk and upfront investment. In short, there is a mismatch between the purpose of interconnector capacity auctions and PPAs – interconnector capacity auctions are designed for trading electricity efficiently between two markets, not for the physical delivery of power in long-term individual PPAs aiming to reduce risk.

[17] It is possible to allocate the responsibility to secure interconnector capacity rights to the corporate buyer (to, for example, enhance the bankability of the project) or to the power producer, or both parties can share the responsibility.

MANAGING CROSS-BORDER TRANSMISSION PRICE RISK

Price risk relates to price exposure of parties to a PPA over its tenor. The auction price for interconnector capacity rights is determined by the forecasted market price spread between market A and market B made by the various bidding parties, over the auction period (whether annual, monthly or daily).[18] Cross-border transmission price risk arises in a physical XB PPA for the responsible party where the awarded auction price does not match the actual price spread between the two markets over the chosen period (annual, monthly or daily).

For example, where the responsible party wishes to transmit power from market A (market of generation asset) to market B (market of load location) because generally electricity prices in market B are higher than in market A and the price in market A equals the agreed PPA price:

i. if the auction price is lower than the actual price spread, the responsible party will pay a lower price by flowing electricity from market A to market B and realize a price saving;

ii. if the auction price of the capacity rights turns out to be correct (i.e., equal to the actual price spread between market A and market B), the responsible party will pay exactly the price spread for their capacity rights and therefore any price savings from a lower price in market A are negated; and

iii. if the auction price is higher than the actual price spread, the responsible party would pay a higher price by flowing electricity from market A to market B and realize a loss. In this case, the most economical option may be to decide not to transmit the electricity but instead to sell the electricity from the PPA asset in market A and purchase electricity for the corporate buyer's facilities in market B, i.e., not executing the physical XB PPA.

As a result, depending on the difference between the auction price and the actual market price spreads, the responsible party will take on considerable price risk which may not align with their desire to achieve price visibility with a PPA. This means a physical XB PPA – using the defintion in this report – will depend on the risk appetite of a corporate buyer, their ability to negotiate a PPA price lower than the price in market A and whether they have other drivers for choosing a physical XB border structure, such as those described earlier in 'XB PPA drivers and benefits'.

Today, there are no publicly known examples of successfully executed physical XB PPAs in Europe due to the risks outlined above[19] and the mismatch between the purpose of the cross-border electricity trading rules and the purpose of a physical XB PPA to achieve price visibility.

In the long term, an increase in market coupling[20] and an expansion of interconnector capacity[21] in Europe will drive greater price convergence across markets and larger single market areas would remove the need for obtaining and using interconnector capacity rights as described above altogether. In the meantime, pan-European energy suppliers may innovate the theoretical physical XB PPA structure described in this report to effectively evidence physical delivery of power without engaging in cross-border trading on interconnectors for individual contracts.

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[18] Where a physical XB PPA is signed for two non-neighboring markets, the same activity must be undertaken for the intermediary market.

[19] For completeness, the responsible party is exposed to volume risk as well as to price risk, as capacity rights purchased in advance cannot exactly match the volume of power generated and transmitted as part of the PPA (with the exception of a fixed baseload PPA). The responsible party is exposed to volume risk for: (a) the missing power supply (for which it is necessary to purchase additional capacity rights in daily auctions); or (b) the volume of capacity rights not nominated, such as FTR and excess PTR (which will be lost or sold). Where the volume of capacity rights does not match the volume of electricity generated, the TSO may purchase electricity in market A/B and sell in market B/A on the responsible party's behalf, as explained in 'Using interconnector capacity rights' in the annex.

[20] 19 European countries are currently part of the Multi-Regional Coupling (MRC) and the European Union plans to continue to add markets to eventually create a single pan-European electricity market.

[21] Interconnector capacity across Europe is currently limited between certain markets, particularly southern markets such as Spain and Portugal, which limits price convergence between markets. Europe aims to increase interconnector capacity equivalent to 15% of total power generation capacity by 2030, and is currently just over halfway to target. For more information on interconnector targets, see: https://ec.europa.eu/energy/topics/infrastructure/electricity-interconnection-targets_en

SOURCING AND CONTRACTING COMPLEXITY

The complexity of contracts is the most challenging hurdle for many corporate buyers considering a XB PPA. The execution of a XB PPA may require a significant pan-European sourcing activity that may be unfamiliar to in-house procurement teams. However, there is also an upside, which includes the potential simplification and consolidation of sourcing activities under a smaller number of contracts covering loads in several markets.

Table 3 outlines the key elements of complexity and the implications for corporate buyers.

Table 3: Sourcing and contracting complexities for XB PPAs and their implications for corporate buyers

CATEGORY	DESCRIPTION AND IMPLICATIONS FOR CORPORATE BUYERS
Sourcing process	Key considerations when undertaking a XB PPA sourcing process include: • In general, XB PPAs are more complex than in-market PPAs due to the involvement of (at least) two electricity markets. A XB PPA requires thorough market expertise to understand and gain comfort with the fundamentals of each market's political and regulatory framework, market fundamentals and resulting key risks. • Going market-by-market to source renewable power via physical in-market or physical XB PPA contracts takes time and resources and requires careful tracking of terms. • Using a competitive bid process to contract a suitable project is generally advisable as there are variations in price and in development and construction risks between power producers. By comparing projects based on overall benefit and risk, corporate buyers can find the most suitable deal for their requirements.
Accounting implications	One of the largest complexities in a PPA is the accounting implications. XB PPAs don't trigger additional IFRS accounting implications compared to in-market PPAs, but as accounting of PPAs is a key concern for virtual PPAs (which are currently the preferred model for XB PPAs), we include the implications here to reiterate their importance in the decision-making process. For companies reporting under IFRS, a contract that includes net-settlement – meaning that the company is subject to gains or losses depending on the outcome of the difference between the wholesale power price and the agreed upon PPA price (like in a virtual PPA) – may be viewed as a derivative. A company's position on derivative and mark-to-market accounting under IFRS may guide its decision to use a virtual PPA structure or not. European and/or local financial services laws usually also treat a virtual PPA as a financial instrument. Ultimately, accounting treatment depends on the contract structure, volatility of the asset, and the risks that can be managed through other means. Accounting practices as well as interpretation of relevant rules cannot be sufficiently discussed within this report. Third-party advisors, financial auditors and legal counsel must evaluate the correct accounting treatment for every PPA. For further commentary, see IFRS accounting outline for Power Purchase Agreements.
Credit implications	Power producers and financiers typically require evidence that the corporate buyer expects to be financially fungible over the duration of the contract. For XB PPAs, one corporate buyer entity may be a party to a XB PPA for several of its affiliated companies in Europe. This will raise important internal discussions regarding, for example, how the group of companies benefiting from the XB PPA shares or allocates the credit (and other) risks. Such decisions will likely require the engagement of European-wide energy procurement professionals and senior stakeholders. It may be necessary to engage colleagues outside Europe if the corporate buyer has its headquarters elsewhere.
Legal implications	A XB PPA may increase legal complexity. Like with credit risk, companies should ask questions about local and corporate legal authority and who has the ultimate authority to make legal decisions. In addition, each market has its own legal system, which will need consideration depending on the structuring of the XB PPA contract.
Taxation implications	Taxation implications may arise for all parties to a XB PPA. Parties must engage their tax departments to understand the tax implications that would apply to them.

CASE STUDY: AB InBev powers European breweries with virtual cross-border PPA

Structure: Virtual XB PPA

Generation market: Spain

Offtake markets: Belgium, Germany, the Netherlands, the Canary Islands and Luxemburg

Capacity: 130 MW

Technology: Solar PV

Tenor: 10 years

In January 2020, AB InBev announced the largest pan-European PPA signed to date to purchase 100% renewable electricity for its European brewing operations.

The 10-year virtual cross-border PPA will cover the electricity demand of AB InBev's 14 breweries in Western Europe with 130 MW of capacity from two new solar farms in Spain. Choosing a virtual cross-border PPA structure enabled AB InBev to aggregate demand from several countries to contribute to the build-out of new solar power plants.

This deal will enable all of AB InBev's European-brewed beers to be produced with 100% renewable electricity. A new symbol on the Budweiser pack amplifies the sustainability message for consumers and encourages sustainable consumer choice.

KEY LEARNINGS

"Choosing a virtual cross-border PPA structure enabled us to maximize our impact across Europe. My advice for others considering a similar approach is to cast a wide net when screening for potential projects and partners, to identify the right choices for your company and intended impact. Corporate buyers should make sure they are comfortable with the virtual PPA structure from an accounting standpoint early on in the process, to strengthen internal buy-in from the start."

Moritz Bernhoerster, Director Global Procurement, AB InBev

5 GO treatment and affiliated renewable electricity procurement claims

5 GO treatment and affiliated renewable electricity procurement claims

The GOs of any renewable PPA drive its environmental value for a corporate buyer. GOs are traceable by their unique reference numbers, making them a credible form of evidence when making renewable electricity procurement and carbon reduction claims. Without GOs, the corporate buyer may receive economic benefits from a XB PPA but cannot make evidenced carbon reduction claims.[22]

According to the EU Renewable Energy Directive, every EU country must implement its own national GO certificate system, which means that systems may differ from country to country. The Association of Issuing Bodies (AIB), which represents 27 national issuing bodies, created the European Energy Certificate System (EECS)[23] in 2002 to standardize GO certificate systems across its member countries. The standardization of certificate systems increases transparency and credibility for GO accounting.

GO TREATMENT FOR XB PPAS

Corporate buyers can use XB PPAs to make renewable electricity procurement claims when they own and cancel the GOs affiliated with the asset(s) covered by the PPA in a 1:1 ratio with their electricity generation (i.e., one certificate for one megawatt hour of power produced). A fundamental consideration for XB PPAs is therefore how each market involved in the XB PPA treats GOs, including the market(s) of generation as well as the market(s) of the company's load. Treatment can vary from market to market and understanding the rules is necessary when evaluating either XB PPA model.[24]

Some markets:

- Allow the transfer of GOs across market borders for cancellation in a different market;
- Prohibit the cancellation of more GOs than there is matching load for in that market, while others allow the cancellation of the excess;
- Do not require the corporate buyer to have load in the market where it purchases and cancels the GOs;
- Have fees for GO cancellation or for excess cancellation; and/or
- Allow only local suppliers to cancel GOs.

As a result, corporate buyers should perform a thorough analysis of GO management in each market where they have PPA projects and electricity load – should they intend to transfer the GOs to each load market and then cancel them in each market's registry.

As an alternative to cancelling GOs in each load market, a corporate buyer can contract a XB PPA in a market that accommodates the cancellation of GOs that do not match their in-market load, which is the case for the majority of AIB member countries.[25] In such cases, the power producer can cancel the GOs on behalf of the corporate buyer in the market where the electricity and GOs are generated, requiring a single cancellation fee, and it is then possible to apply the associated claims on a pan-European basis. In order to understand the restrictions in each market, the corporate buyer should refer to the EECS domain protocols and the AIB datasheet on imposed conditions for trade, expiry and cancellation.

Corporate buyers should be mindful of any potential changes to current regulations on how to and who can cancel GOs and make sure the XB PPA contract accounts for future changes to regulation (see footnote 24).

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[22] For further information on the GO system in Europe, see https://www.aib-net.org/certification. For further commentary on EACs for corporate renewable PPAs, see WBCSD report Innovation in Power Purchase Agreement Structures (March 2018).

[23] For more information, see https://www.aib-net.org/eecs.

[24] The current legal framework for treatment of GOs is set by the 2009 Renewable Energy Directive (RED). This law has been superseded by the Recast Renewable Energy Directive (REDII), which entered into force in December 2018. The new law will increase standardization of GO treatment across EU countries, which member countries must fully implement into national law by the end of July 2021. See the Guide to REDII Article 19 Implementation (RECS International, March 2019) for further information.

[25] This is especially relevant for physical XB PPAs with cross-border electricity trading, where if market prices are higher in the market where the electricity is produced, power will flow in the opposite direction on the interconnector and the nominated power cannot be transmitted. The ability to cancel GOs in the market of generation ensures that the corporate buyer can still receive the environmental attributes associated with the project in times of reverse flow.

GO DISCLOSURE AND REPORTING FOR XB PPAS

It is not sufficient to be allowed to cancel GOs generated in one market to cover demand in another market – corporate buyers must also understand the guidance on GO disclosure and reporting to be able to make evidenced carbon reduction claims for a XB PPA.

The GHG Protocol Scope 2 Guidance standardizes how corporate buyers measure emissions from purchased or acquired electricity using two accounting methods: location-based and market-based.[26] For a XB PPA, corporate buyers must use the market-based accounting method in addition to the location-based method, as it reflects emissions from electricity that companies have purposefully chosen.[27] For the market-based accounting method, corporate buyers must state the origin of GOs and ensure that they adhere to Scope 2 Quality Criteria.

For XB PPAs, a key consideration within the Scope 2 Quality Criteria is that the contractual instruments (including PPAs and GOs) must be "sourced from the same market in which the reporting entity's electricity-consuming operations are located and to which the instrument is applied".[28] Therefore the definition of a "market boundary" in Europe is essential to be able to make evidenced carbon reduction claims from renewable electricity procurement through a XB PPA in Europe.

The Scope 2 Quality Criteria refer to market boundaries but leave the determination of a market boundary open to interpretation, directing corporate buyers instead to follow guidance from regulatory authorities and/or certificate issuing bodies.

In Europe, AIB member countries allow the transfer of GOs to other AIB member countries, as well as to non-AIB member countries through 'Ex Domain Cancellations'.[29] However, from a reporting standpoint, there are different interpretations of what constitutes an acceptable market boundary when using contractual instruments (including PPAs and GOs) to make evidenced carbon reduction claims in Europe, even if Ex Domain Cancellations are permitted:

- Market boundary guidance issued by RE100 in May 2019 states that the majority of European countries make up a single market for renewable electricity sourcing and reporting, meaning that the market boundary encompasses all countries within the European Single Market.[30]
- Guidance on the accounting of Scope 2 emissions issued by CDP issued in July 2020 states that from 1 January 2022 the market boundary in Europe will encompass AIB member countries,[31] whereas for all non-AIB member countries the market boundary will be the same as their geographical boundary. Contracts signed up until 31 December 2021 outside of the AIB market boundary will be accepted for CDP reporting until the end of the respective contract period.

NB: this guidance is current as of December 2020 and is liable to change. Please check sources for updated guidance.

While the definitions will differ from 1 January 2022 and have changed over time, the main message is that the higher the traceability and transparency of the approach that a corporate buyer chooses, the more robust the renewable electricity procurement claim is. In the future, we hope to see a market consensus on the definition of a market boundary in Europe for reporting purposes. As the AIB increases its membership regularly, the above two definitions are expected move closer to agreement over time.

"GO treatment was an important factor in our decision to choose a virtual cross-border PPA. Under Spanish domain protocol today, both the power producer and/or retail licensed supplier can cancel the GOs on behalf of the corporate buyer and cancellation of GOs can be done in excess of in-market load. Moreover, GOs issued in Spain can be exported and canceled in all AIB member countries. This allows Novartis to claim and report renewable electricity procurement for all generation affiliated with our virtual cross-border PPA."

Mark Scoffin, Head of Procurement – Utilities, Novartis

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[26] A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data). A market-based method reflects emissions from electricity that companies have purposefully chosen.

[27] Corporate buyers using contractual instruments, such as a XB PPA, must report Scope 2 emissions using both the location-based method and the market-based method. This is also known as "dual reporting." See section 1.5.1 of the GHG Protocol Scope 2 Guidance.

[28] GHG Protocol Scope 2 Guidance, p. 60

[29] For more information, see: https://www.aib-net.org/facts/market-information/statistics/ex-domain-cancellations

[30] Defined as countries from the European Union (EU-28) and the European Economic Area, but excludes Iceland, which does not have an interconnection to mainland Europe.

[31] For a full list of AIB members and prospective members, see: https://www.aib-net.org/facts/aib-member-countries-regions/aib-members

CASE STUDY: HEINEKEN, Nouryon, Royal Philips and Signify team up to combat climate change with virtual cross-border PPA in Europe

Structure: Virtual cross-border PPA

Generation market: Finland

Power producer: Neoen

Capacity: 126 MW

Technology: Onshore wind

Tenor: 10 years

In December 2020, a consortium of four leading Dutch companies, HEINEKEN, Nouryon, Royal Philips and Signify, announced the signing of a joint virtual cross-border PPA in Finland. With advisory support from Schneider Electric, the PPA was signed with French renewable energy developer Neoen for a 126 MW portion of the Mutkalampi onshore wind farm, located in the west of Finland.

The Consortium represents global sustainability leaders across a broad range of industry sectors: chemicals, health technology, lighting and brewing. The virtual cross-border PPA structure enabled them to take a collaborative and innovative approach to addressing their European footprint, by joining forces and making significant progress towards their ambitious individual sustainability and renewable electricity targets.

A key reason for choosing the virtual cross-border structure was to allow the companies to retire the GOs from the project on a pan-European basis, to address the electricity footprint in countries where the in-country load is too small to address with individual PPAs. In total, the Consortium's part of the Mutkalampi wind farm is expected to add over 330 GWh of clean electricity to the grid annually.

KEY LEARNINGS:

"When a group of companies joins forces on a project like this, they can have a bigger impact and accelerate the transition to renewable electricity sources. This is key to address the European electricity footprints of all companies involved in a scalable and impactful way, as well as to achieve the targets as set out by the Paris Agreement. One of our key learnings is that you need to team up with likeminded sustainable companies for it to become a success. We hope to inspire other companies to follow this example by considering multi-buyer structures to maximize their impact when sourcing renewable energy."

Bas Lubach, Global Category Buyer Energy, Heineken

6 Internal and external communications for XB PPAs

6 Internal and external communications for XB PPAs

The concept of a European XB PPA is relatively new to corporate buyers, project developers, and the associations and NGOs that help to shape and guide the market, particularly when it comes to communicating environmental claims.

Clear internal and external communications help stakeholders understand the drivers behind a company's selected approach and the intended impact – which the individual company strategy often ultimately drives.

When communicating externally about XB PPAs, corporate buyers should:

- Be transparent about the details of the project they are buying electricity from, including location, technology, size and additionality;
- Clearly state the drivers for choosing this contract type and explain how it fits with their wider portfolio of renewable electricity procurement and their company's procurement strategy;
- Share the impact that the XB PPA has on the company's renewable electricity purchasing targets, as well as on the national electricity system in all markets involved; and
- Use reporting standards to evidence that the XB PPA meets recognized guidance for making renewable claims.

For example, a corporate buyer may be able to achieve a better yield and price from a solar PPA by procuring power in a market with higher load factors, such as Spain (i.e., where higher solar radiation results in higher electricity production), to meet its electricity demand in a market with a lower load factor, such as in Belgium. This has a wider electricity system impact by encouraging the development of solar projects in the locations best suited to that generation technology and thereby optimizing resources.

Such information will also help NGOs support the development of more XB PPAs. Their position on XB PPAs varies worldwide, but in Europe, where there is a high level of interconnection and geographical proximity between markets, many do see XB PPAs as a credible method of corporate renewable electricity sourcing as long as:

1. The XB PPA adheres to reporting standards for making environmental claims (see 'GO treatment and affiliated renewable electricity procurement claims'); and
2. The corporate buyer has considered procuring electricity in-market and concluded that the driver(s) for selecting a XB PPA are sufficient to warrant a preference over an in-market PPA.

Effective internal communication is just as important as external communication. Generally, corporate renewable PPAs involve a significant number of internal stakeholders due to their size, complexity, risk profile and public/NGO visibility and scrutiny. A XB PPA amplifies the complexity of internal stakeholder engagement when stakeholders – including senior stakeholders – from a variety of countries, who speak a variety of languages and have a variety of concerns must cooperate. Clarifying the key decisions to internal stakeholders at an early stage will increase understanding and internal buy-in.

CASE STUDY: DSM on course to outpace their 75% renewable electricity target with virtual cross-border PPA in Europe

Structure: Virtual XB PPA

Generation market: Spain

Offtake markets: 9 European countries

Power producer: EDPR

Capacity: 76 MW

Technology: Solar PV and onshore wind

Tenor: 15 years

In April 2020, nutrition, health and sustainable living company Royal DSM signed its largest PPA in Europe to date: a virtual cross-border PPA to source electricity from one wind farm and two solar power plants in Spain.

The virtual cross-border PPA covers the electricity demand of DSM facilities in 9 countries across Europe. Combining these loads and using them to contribute to the development of new wind and solar capacity was the main driver for choosing a cross-border structure. As all 9 countries fall within the market boundary guidelines from RE100 and CDP, the loads can be bundled together under a single cross-border PPA.

With the announcement of this deal, DSM is on course to outpace their target of reaching 75% of purchased electricity from renewable sources by 2030, also being an important part in delivering against their Science Based Target.

KEY LEARNINGS:

"Breaking ground with new contract structures can introduce complexity compared to a business-as-usual approach, but the outcome can have a greater impact on driving the energy transition. Internal communication is essential from day one and remains extremely important throughout the process. For a cross-border PPA structure, internal stakeholders need to be brought along on the decision-making process of choosing a cross-border rather than in-market structure and selecting a virtual rather than physical cross-border PPA. Corporate buyers should consult industry standards (e.g. market boundary guidance from RE100 and CDP) and drive forward the option that has the largest impact whilst making business sense."

Sim van der Linde, Project Director Renewable Energy, Royal DSM

7 Conclusion

7 Conclusion

The concept of a XB PPA (or pan-European PPA) is relatively new to corporate buyers, project developers, utilities, traders and NGOs. Companies have already signed the first virtual XB PPAs in Europe and favorable project economics are attracting more corporate buyers to consider XB PPAs. An ever-more connected electricity market in Europe and the single GO system are supporting the feasibility and acceptability of XB PPAs for all market players alike.

XB PPAs may provide corporate buyers with additional benefits compared to in-market PPAs, including the ability to aggregate their load in different locations under a single XB PPA contract and therefore the opportunity to source renewable electricity at a large scale to meet environmental goals faster.

However, XB PPA sourcing and contracting can be complex and it is important that corporate buyers fully understand the risks before entering into a contract of this type, including but not limited to:

- Like all PPAs, XB PPAs require due diligence to ensure that all counterparties have been assigned and are adequately managing the risks they are best placed to manage. The added sourcing and contracting complexity for XB PPAs increases the need for a thorough and robust due diligence process.
- Companies considering XB PPAs should learn about the differences between in-market and XB PPAs, as well as the distinction between physical and virtual XB PPAs.
    - Virtual XB PPAs introduce increased basis risk compared to in-market virtual PPAs, due to price differences between the electricity market of generation and loads. IFRS accounting implications may arise for both virtual XB and in-market PPAs.
    - Physical XB PPAs introduce cross-border transmission price risk and to date, complexities arising from a mismatch between the purpose of the existing rules of cross-border power trading on interconnectors and the needs for long-term PPAs have been prohibitive for physical XB PPA structures in Europe.
- Corporate buyers should also ensure they understand how GOs will be treated in any XB PPA they are evaluating, so that they adhere to the relevant reporting standard and ensure the use of the certificates to make legitimate environmental claims.
- It is necessary to weigh the challenges of executing a multi-market contract at significant scale – such as stakeholder management across a diverse deal team and credit ownership – against the potential benefits that a XB PPA may provide.

Despite the complexities, as renewable electricity markets in Europe continue to grow and mature, more companies may favor the XB PPA model for its upsides. We expect to see innovation in the sourcing and contracting of XB PPAs in Europe in the coming years, particularly to tackle the risk mitigation and management challenges laid out in this report. With these innovations and a supportive enabling environment, XB PPAs have the potential to make a material contribution to additional renewable electricity deployment in Europe.

Annex: Process of power trading on interconnectors in Europe

An interconnector is the physical power line that allows the exchange of electricity between two neighboring markets. Interconnectors contribute to security of supply, stabilize grid frequency and enable commercial power flows between electricity markets. They are operated by transmission system operators (TSOs), which can be wholly or partially publicly-owned, or wholly privately-owned.

Cross-border electricity trading using interconnectors predominantly takes place in four parts: (1) electricity purchase in **market A**; (2) purchase of interconnector capacity rights via auctions; and (3) use, loss or sale of purchased interconnector capacity rights; and (4) if the interconnector capacity rights are used, flow of the corresponding volume of electricity from **market A** to **market B** and electricity sale in **market B**.

It is important to recognize that interconnectors have physical capacity limits on the volume of power they can flow from one market to another. The purchased capacity rights will be either physical (**PTRs**) or financial (**FTRs**), as determined by the regulator, which affects whether the capacity rights can be used, lost or sold. There may also be restrictions on time of use (such as in the case of maintenance) and, in Europe, on the direction of power flow, because this is determined by the wholesale power prices in each market and the capacity allocation and congestion management guidelines.[32]

OBTAINING INTERCONNECTOR CAPACITY RIGHTS

Market participants typically gain access to interconnectors by purchasing capacity rights (i.e., capacity options) through competitive annual, monthly and daily explicit auctions and daily implicit auctions.[33] The TSOs have created platforms and rules to standardize the auction mechanisms[34] including the requirement that part of the interconnector capacity may be withheld from auctions to remain available to TSOs to ensure system security. Capacity may also be awarded through bilateral contracts (though derogation may be required). As TSOs commonly sell capacity rights through explicit auctions at a loss, there are also several borders that do not allow the offering of capacity rights in any form to prevent losses resulting in increased network tariffs for local consumers.

Capacity rights currently have a maximum duration of one year for almost all auctions. In Europe, the auction works with a marginal pricing mechanism in which market participants' bids are placed in merit order, from the highest to the lowest, and the saturation of the capacity offered in that auction determines the auction marginal price. All bids greater than or equal to the marginal price are awarded with the determined marginal price.[35] Bids are generally based on market participants' expectations for the price spread between the two markets concerned.

[32] Commission Regulation (EU) 2015/1222 of 24 July 2015 establishing a guideline on capacity allocation and congestion management (CACM).

[33] For implicit auctions, capacity rights and electricity are auctioned together, which ensures that the power flow will be from the low-price market to the high-price market. Implicit auctions are applicable for short-term capacity rights (predominantly daily) and are therefore not explained in this report. A short explainer on explicit and implicit capacity auctions can be found here.

[34] For example, see Joint Allocation Office for Central Western Europe and Italy: https://www.jao.eu/main

[35] Auction results can be found here.

USING INTERCONNECTOR CAPACITY RIGHTS

When capacity rights are purchased on an annual basis, explicit auctions are employed. In an explicit auction, interconnector capacity is auctioned independently from electricity.[36] Where the volume intended to be transmitted is variable, the responsible party may bid for the maximum capacity or a proportion thereof and will then need to sell or buy the excess or missing capacity rights in daily auctions.

For explicit auctions, the obtained capacity rights will be either physical (**PTRs**) or financial (**FTRs**), as determined by the regulator, which will affect the way that the capacity rights can be used. FTRs are more commonly issued in Europe.

In the case of PTRs, the responsible party who has been awarded annual capacity rights may:

- Use the capacity by nominating its use daily to the interconnector operator. Nomination must be done before the SDAC gate closure time and is generally binding.
- Choose not to use the capacity on a daily basis. The capacity will then be automatically reallocated in daily implicit auctions if a "Use it or Sell it" rule applies (where the responsible party receives remuneration via the daily auctions with a market spread between market A to market B or zero, whichever number is larger); or is lost and remitted to the interconnector operator if a "Use it or Lose it" rule applies (in which case the responsible party forfeits the amount paid for the PTR).
- Nominate and use a proportion of the capacity rights and sell or lose the remainder, where the expected volume of generated power is lower than the volume of previously obtained capacity rights.[37]

If the responsible party chooses to use the capacity rights, it nominates separate volumes for each hour at the day-ahead stage. Once it has nominated capacity rights, the responsible party must transfer the nominated volume from market A to market B. Even with accurate electricity generation forecasts, the day-ahead forecast can never be 100% correct. If the responsible party nominates a higher/lower volume than produced, the TSO will purchase electricity in market A/B and sell in market B/A on the responsible party's behalf (unless the responsible party makes intraday trades to balance the mismatch before gate closure for each hour). For these reasons, the process of nominating capacity rights is complex and it is necessary to manage it carefully to minimize the costs of these corrections taken by the TSO on behalf of the responsible party.

In the case of FTRs, the responsible party cannot choose to use the capacity rights. Instead, the same process as described for a PTR with "Use it or Sell it" when capacity is not nominated will happen automatically. The owner of an FTR will receive a payout for each hour based on either the price in market B minus the price in market A and zero, whichever is higher.[38]

[36] A short explainer on explicit and implicit capacity auctions can be found here.

[37] Participants may also resell the awarded capacity on a secondary market on an annual or monthly basis, though this is interconnector trading speculation.

[38] Note that FTRs are available in two different versions: FTR Options and FTR Obligations. The described form here is FTR Options, where the payout equals the sum of the positive price differences from market A to market B. For an FTR Obligation, the payout is the sum of both the negative and the positive price differences from market A to market B. The Nordic EPADs (Electricity Price Area Differentials) are financially similar to FTR Obligations. All other FTRs in Europe are FTR Options.

Glossary

Cross-border PPA: A PPA where a corporate buyer purchases renewable electricity and GOs generated outside the electricity market of their electricity load.

Corporate buyer: The buyer of electricity in a PPA (also referred to as an offtaker, energy buyer or power consumer)

Corporate renewable PPA: A contract between the corporate buyer(s) and the power producer (developer, independent power producer, investor) to purchase renewable electricity at a pre-agreed price for a pre-agreed period of time. The contract contains the commercial terms of the electricity sale: contract length, point of delivery, delivery date/ times, volume, price and product.

Energy Attribute Certificate (EAC): A certificate that verifies that 1 MWh of renewable electricity was produced and added to the electricity grid.

European Single Market: A geographic area that covers EU Member States plus the European Economic Area states of Iceland, Lichtenstein and Norway.

Guarantee of origin (GO): The name for Energy Attribute Certificates commonly used in Europe.

Independent power producer (IPP): An entity that is not a public utility but that owns facilities to generate electric power for sale to utilities and end users.

Interconnector: The physical power line that allows the exchange of electricity between two neighboring markets.

Interconnector capacity rights: The right to transmit a specified volume of electricity across an interconnector from one electricity market to another.

Pan-European PPA: A cross-border PPA where the corporate buyer procures power for its load across multiple countries in Europe.

Physical PPA: A PPA where there is a physical grid network connection between the generation asset and the load of the corporate buyer, where the electricity delivered under the PPA is sleeved through an energy service provider. Also known as a direct or sleeved PPA.

Power purchase agreement (PPA): A contract between a power producer and a buyer of electricity for an agreed tariff, tenor and capacity.

Tariff: The cost per unit of electricity that a buyer pays.

Virtual PPA: A financially settled PPA, where a physical network connection between the generation asset(s) and the operational load is not required. Also known as a financial or synthetic PPA.

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ABOUT WBCSD'S RESCALE INITIATIVE

REscale brings together leading companies representing the full renewable electricity value chain to accelerate deployment of renewables and the transition to a low-carbon electricity system. REscale members share the ambition to scale up renewable deployment beyond average growth.

This report builds on previous WBCSD reports on corporate power purchase agreements: Corporate Renewable Power Purchase Agreements: Scaling up globally (October 2016), Innovation in Power Purchase Agreement Structures (March 2018) and How Multi-Technology PPA Structures Could Help Companies Reduce Risk (March 2019). The platform undertaking this work is called the Corporate Renewable PPA Forum.

To find out more about REscale, the Corporate Renewable PPA Forum and previous reports, visit our webpage or contact:

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This report has been produced in collaboration with the RE-Source Platform, Europe's leading forum for corporate renewable energy sourcing. The RE-Source Platform seeks to remove barriers for companies to procure renewable electricity by opening markets, raising awareness through its Buyers' Toolkit and connecting corporate renewable energy buyers and sellers.

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