

Corporate Power Purchase Agreements

The Preferred Route for Corporates to Secure Renewable Energy Supplies in a Decarbonized World

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1. The Changing Renewables Support Landscape

Over the last couple of years, a combination of subsidy erosion or removal, lower auction prices, reduction in embedded benefits and power market volatility has led to an absence of long-term revenue certainty and forced generators and developers to explore new models for their projects. Simultaneously, corporates are increasingly targeting a reduction of their energy costs at the same time as significantly reducing their environmental footprint, whilst all the while maintaining a continuous business operation. The high profile RE100 campaign, a global corporate leadership initiative bringing together influential businesses committed to sourcing 100% renewable electricity, has seen some of the world's largest companies commit to this goal.¹ In December 2019, the RE100 passed the 200-member milestone.



2. Corporate PPAs

CPPAs are not a new phenomenon, but the size and frequency of deals involving CPPAs have seen a significant rise. According to Bloomberg New Energy Finance (BNEF), in 2017 there was nearly a 20% increase (from 2015) in the level of clean energy generated through CPPAs.² In 2018, BNEF estimates that large corporations bought 13.4 GW of renewable power from generators through CPPAs, which is more than double the amount in 2017.³ Due to the growing demand of companies seeking to decarbonize, the CPPA market is likely to see further increase as global corporations are now looking more at this market for renewable energy procurement solutions. BNEF estimates signatories to the RE100 initiative alone will need to fund around 102 GW of new solar and wind projects globally to meet their 2030 commitments.⁴



1 RE100overview, "The world's most influential companies, committed to 100% renewable power", available at: <http://there100.org/re100>, accessed 15 January 2019.

2 5.4 GW of clean energy was purchased by businesses in 2017, compared to the original record of 4.4 GW set in 2015. Mint Selection, "Corporate PPAs In Renewable Energy" 10 April 2019, available at: <https://www.mintselection.com/corporate-ppas-in-renewable-energy/>, accessed 3 February 2020.

3 13.4 GW of clean energy was bought by 121 corporates via CPPAs in 2018 compared to 6.1 GW in 2017. Renewables Note, "Corporate PPAs on the rise, but not yet an easy task", available at: <https://renewable-snow.com/news/corporate-ppas-on-the-rise-but-not-yet-an-easy-task-653411/>, accessed at 3 February 2020.

4 Brendan Coyne, "Corporate PPAs double in 2018 as mid-market buyers emerge", theenergyst, 28 January 2019, available at: <https://theenergyst.com/corporate-ppas-double-2018/>, accessed at 3 February 2020.



A CPPA is long-term agreement (typically 15 – 20 years), linked to the output of a specific generating station under which a large business (as the buyer/off-taker) contracts directly with a generator (the “seller,” which is often the developer or project owner), instead of a licensed electricity supplier, to purchase its electricity, either from an existing or new-build renewable project, and to purchase the project’s renewable attributes (such as renewable energy certificates or “RECs”). This differs from the traditional approach whereby corporates would simply buy electricity from licensed electricity suppliers/utilities (under supply agreements), who in turn bought power from generators under standard power purchase agreements to supply to their corporate customers or sell on the wholesale market. Under CPPAs, generators do not supply customers directly, unlike in a private wire arrangement.

Counterparties to CPPAs (the owner of the renewable generator (as seller) and the corporate (as buyer)) can contract regardless of the generator’s output capacity, the corporate’s supply demand or the location of the parties (corporate buyers do not need a direct physical connection to the generating plant, as would be the case under a private wire arrangement). There are broadly two basic types of CPPAs:

- 1. Sleeved/Physical PPAs** – Corporates are able to source renewable energy from third party generators via green CPPAs, under which corporates enter into a power purchase agreement (PPA) with a renewable energy generator. For example, under such a PPA, the generator supplies the corporate with green electricity at a fixed price for a specified long-term period (sometimes subject to some agreed annual escalation). Under this structure, electricity is physically transmitted from the generator to the customer although, with a sleeve, the transaction sometimes also involves a third party supplier providing the sleeving service on top of the traditional energy supply function.
- 2. Virtual/Synthetic PPAs** – Another type of CPPA is a “virtual PPA” (also called a VPPA or a “synthetic PPA”), which is similar in structure to a CPPA, but has some fundamental differences. First, there is no physical delivery of energy to the customer; rather the power produced by the green energy generator is sold into the wholesale market. Second, the customer acquires the RECs associated with such sale even though it does not receive the energy directly. Third, the generator and customer effect ongoing financial “swap” transactions based on the difference between a contractually agreed fixed priced of power (as if the customer had purchased the power) and the variable spot market price. The commonality between a CPPA and VPPA is that the electricity is generated from renewable sources, the customer receives the RECs and the end result there is a long-term price stability for the electricity.⁵

Both of these structures are discussed in greater detail in Part 3 of this Report.

⁵ Innogy website, Green Power Purchase Agreements, available at: <https://iam.innogy.com/en/about-innogy/innogy-innovation-technology/renewables/power-purchase-agreements>, accessed 15 January 2020.



CPPAs offer various advantages primarily due to the fixed or innovative long-term pricing terms that can be agreed between the parties (as further discussed in Part 4 of this Report) and, as such, are becoming:

- The emerging route-to-market preference for projects that cannot benefit from price stabilization mechanisms (such as tax credits or green certificates (also generally known as RECs or “Green Tags”)) that mitigate exposure to merchant risk
- A key enabler of subsidy-free projects
- The preferred route for energy procurement for corporates instead of entering into green tariffs or complex private wire arrangements

Across Europe and the US, large corporates have entered CPPAs to allow them to directly demonstrate their green credentials. In Europe there were 2.4 GW of renewable CPPAs in 2018 (up 70% from 2017 and up 80% year-on-year since 2013).⁶ The vast majority (85%) of these renewable CPPAs have been signed for wind energy, mainly because much of the activity has focused on countries with a high wind resource – Norway, Sweden, Netherlands and the UK. Strong activity in the first two is also attributable to the Nord Pool power market, which facilitates the cross-border sale of electricity between those two countries.⁷

Wind projects typically have greater capacity than solar PV projects, enabling buyers to procure larger volumes of power in single transactions and offer 24 hour operations.⁸ CPPAs have also expanded beyond first-mover tech giants, such as Google and Microsoft, to gain momentum across a variety of sectors, especially telecoms, consumer products and financial services.⁹ The UK itself has so far seen a relatively slow adoption of CPPAs, however, those that have been signed involve some of the country’s largest commercial and industrial organizations.

6 Re-Source Platform, Introduction to Corporate Sourcing of Renewable Electricity in Europe Report, October 2019.

7 Richard Sverrisson, Liquidity set to rise amid PPA boom, *Montel News*, 12 March 2019, available at: <https://www.montelnews.com/fr/story/liquidity-set-to-rise-amid-ppa-boom/990340>, accessed 3 January 2020.

8 Ibid (Re-Source Platform, Introduction to Corporate Sourcing of Renewable Electricity in Europe Report, October 2019).

9 Renewable energy strategy and PPA implementation; helping corporates navigate the changing energy landscape, EY report, 2014, available at: [https://www.ey.com/Publication/vwLUAssets/EY-renewable-energy-strategy-and-PPA-implementation/\\$FILE/EY-renewable-energy-strategy-and-PPA-implementation.pdf](https://www.ey.com/Publication/vwLUAssets/EY-renewable-energy-strategy-and-PPA-implementation/$FILE/EY-renewable-energy-strategy-and-PPA-implementation.pdf), accessed 3 January 2020.

3. CPPA Structures

As noted above, CPPAs relating to offsite generation can take the form of either a traditional PPA or a contract for difference, and can be broadly broken down into two groups: (1) Sleeved/Physical CPPAs – involving energy supply within the same electric system as the corporate – and (2) Virtual/Synthetic CPPAs – being just financial transactions with no physical transfer (title to energy) between the parties. In each case, the generator and end consumer are contractually linked, so that the power attributable is (and, in the case of renewable energy, the RECs are) bought by the end user directly from the generator. As discussed above, the two models do differ from each other in a number of significant ways, as further outlined in more detail below.

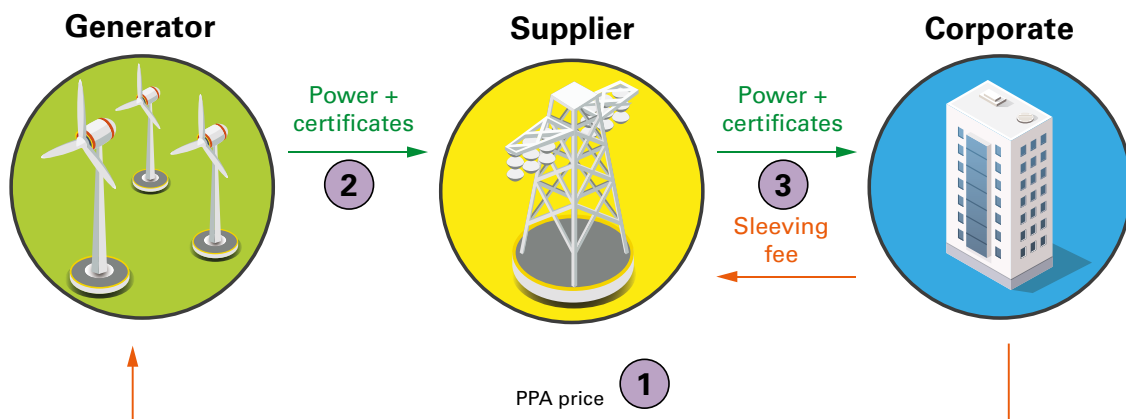
a) Sleeved/Physical PPAs

Where the generating plant is not directly connected to the corporate’s site, but the plant is on the same grid network as the corporate’s offtake point, the corporate can enter into a PPA and appoint a licensed utility/electricity supplier to act as an intermediary (via a back-to-back supply arrangement between the corporate off-taker and the supplier) to handle the transfer of power on its behalf for a fee. The corporate will need to agree with the utility how the intermittent electricity output of the renewable generator will be credited against its electricity requirements.

- The action of transferring the electricity through the utility or licensed supplier, thus hedging the customer’s consumption profile is referred to as “sleeving.” Under this structure, the utility sleeves the power through the grid and sells power to the corporate at its site.
- The corporate will typically be required to pay a premium to the utility to take the intermittency risk (to provide power when the generator is not producing power (renewable power is intermittent)) out of the deal, getting a baseload shape sleeved into their supply contract, which de-risks the balancing side of the deal,¹⁰ as well as a the topping-up of the renewable electricity (with extra, if needed – when the generator is not generating) to meet the corporate off-taker’s energy demands.
- Sleeved PPAs can include a variety of services, such as aggregating various generators to a portfolio, balancing group management, supplying residual or surplus quantities of electricity, preparing feed-in forecasts, marketing certificates or assuming various risks (such as balancing energy costs or default/insolvency risks of a contractual partner).¹¹
- Sleeved PPAs guarantee a long-term hedge (typically greater than 10 years), offering the opportunity to have access to large and competitive off-site projects developed in areas with an optimized location and resource.¹²

In this model, the corporate off-taker is heavily reliant on the supplier providing the sleeving, top-up, and balancing functions. This increases the complexity of the energy supply agreement and reduces the flexibility to change suppliers. Depending on the supply arrangement between the corporate off-taker and the electricity supplier, the electricity being supplied may be restricted to a specific site of the corporate off-taker. Taking all of these factors together, the model does not easily allow flexibility for multi-buyers.¹³

Diagram 1. Example Physical/Sleeved PPA Structure (with Green Certificates)



- 1 Corporate agrees to a PPA (Fixed* or discount-to-market) price with the generator to purchase the electricity it will generate. It will also agree to the renewable certificates.
- 2 Generator enters into a back-to-back PPA to sell the electricity to the supplier.
- 3 Generator will transfer the electricity to the supplier, which will sleeve it through the grid consumption sites.

Accessed Dec. 10, 2019.

PPA = power purchase agreements

* Fixed prices are typically index-linked to factor in inflation.

Source: World Business Council for Sustainable Development, 2017

10 The PiE interview: corporate PPA specialist, the Ecompany, Power in Europe, 11 February 2019.

11 Next Kraftwerke, What is a PPA, available at: <https://www.next-kraftwerke.com/knowledge/ppa-power-purchase-agreement>, accessed 5 January 2020.

12 Acciona Energy, “Corporate PPA Powering your company with clean energy” April 2019, available at: https://mediacdn.acciona-energia.com/media/25688560/foll_energia_ppa_2019_eng-1-4.pdf, accessed 15 January 2020.

13 Everoze, Our essential cribsheet to the top 3 corporate PPA models, February 2018, available at: <https://everoze.com/ppa-models/>, accessed 5 January 2020.

b) Virtual/Synthetic PPAs

VPPAs are purely financial transactions (rather than a contract for the sale of electricity), where the corporate buyer does not acquire and is not responsible for receiving the physical electrons generated by the generator. VPPAs are essentially a form of a financial hedge under which a fixed price cash flow is exchanged for both a variable priced cash flow and renewable energy certificates. They can be structured as a swap or an options agreement, including put/call options providing a price collar. The generator sells the electricity it produces into the wholesale market where the generation plant is located and the corporate buyer continues to buy its energy from the wholesale market where the buyer is located – and these two markets are often different. However, the parties enter into a VPPA to provide price security under the agreed structure and to sell RECs to the corporate buyer. In this way, synthetic PPAs decouple the physical flow of electricity from the financial flow. The following are the basic elements of a VPPA transaction:

- The corporate continues to procure electricity at a specific delivery point where the corporate's load center (i.e., demand center) is located (typically the corporate's local grid). Such purchases are not addressed in the VPPA.
- The renewable energy project and the energy user do not need to be in the same location (and indeed are often in completely different power markets.)
- Under the VPPA, the parties set a "strike price" associated with such agreed portion of the power generated by such renewable energy facility as delivered to an agreed delivery point. In conceptualizing this, it helps to think of this as the guaranteed price the generator would have received from the corporate buyer if it had actually been buying such power, irrespective of fluctuations of wholesale electricity or market prices. This guaranteed fixed price for the power output is critical for developers seeking to finance new-build plants.
- The renewable energy generator liquidates the electricity at the available wholesale market pricing where the plant is located. If this price is greater than the "strike price," the generator pays the positive difference to the corporate/buyer. Conversely, if the "strike price" is less than the market price, the corporate/buyer will pay the generator the difference up to the strike price.¹⁴
- Settlement occurs typically on a monthly basis with a form of a contract for difference (CFD) agreement or a long-term commodity swap transaction under the 2002 ISDA Master Agreement being the most common structure.

To understand the hedge effect of this type of settlement, it is helpful to consider scenarios in which the wholesale energy prices fluctuate in perfect unison in the two wholesale markets (i.e., the one in which the generator is located and the one in which the corporate buyer is located). For example, if the wholesale prices increase in the generator's market to above the "strike price," the corporate buyer will receive a payment of the difference, but this payment will be used to offset the increase in prices in its home market. Conversely, if the wholesale prices decrease in the generator's market to below the "strike price," then the corporate buyer will have to make a payment of the difference to the generator, but this payment will also be offset by lower energy costs in its home market.

In reality, however, while the movements of two separate markets might experience similar trends, they will rarely fluctuate in perfect unison. Therefore, in doing VPPA transactions, it is important to involve market experts who can analyze, predict and model likely trends, and help the corporate buyer to ensure that the agreed "strike price" builds in a sufficient buffer, so that, under the most likely scenarios, the corporate buyer will be in a favorable (or at least acceptable) financial position.

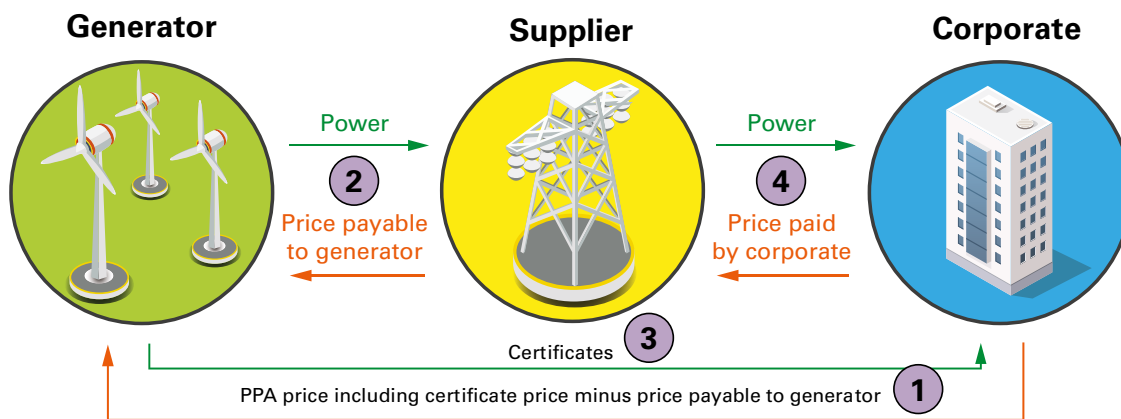
Although there is no physical delivery of electrons from the generator to the corporate buyer, under the VPPA the corporate buyer will typically receive the renewable energy certificates associated with the quantity of energy subject to the settlement described above. This acquisition of RECs is critical to the corporate's ability to demonstrate to its management and shareholders that it is meeting its sustainability objectives and supporting renewable energy generation.

As noted above, the VPPA arrangement is purely financial and the corporate still needs to meet its electricity load through traditional channels (i.e., though continuing to buy electricity under its supply agreement with a licensed electricity supplier). The VPPA does not address this and, therefore, does not change the buyer's retail/supply relationship with its electricity supplier. In addition, as a VPPA model does not involve the physical transfer of electrons, balancing risk is not relevant.

The corporate need not be involved in the PPA negotiations between the generator and the electricity supplier and the VPPA can piggy-back off a number of that PPA's terms, however a framework agreement between all three parties (the generator producing the electricity, the supplier off-taking and liquidating the electricity under the PPA between it and the generator, as well as the corporate, which provides the fixed price to the generator) would be recommended.

¹⁴ Sarah Penndorf, Renewable energy power purchase agreements, 3Degrees, 5 February 2018, available at: <https://3degreesinc.com/latest/ppas-power-purchase-agreements/>, accessed 5 January 2020.

Diagram 2. Example Virtual/Synthetic CPPA Structure (With Green Certificates)



- 1 Corporate agrees to a PPA price with the generator and a price for renewable certificates.
- 2 Generator delivers renewable energy to the grid and is paid by a supplier a variable spot price.
- 3 Generator and corporate settle the difference between the variable market price and the strike price and the generator delivers renewable certificates to corporate.
- 4 Corporate continues to buy its power from the supplier at the variable market price, which is now hedged by the synthetic PPA.

Accessed Dec. 10, 2019.

PPA = power purchase agreements

* Fixed prices are typically index-linked to factor in inflation.

Source: World Business Council for Sustainable Development, 2017

VPPAs allow for flexibility in the number and location of loads supplied and are mainly used to build plants where the renewable resource is strongest, but where the corporate buyer is unable to procure power wholesale or wants to avoid a sleeving fee,¹⁵ and are most common in liberalized power markets, such as the US where this contractual model has made up 82% of all US deals in 2019.¹⁶ VPPAs are a good option for large electricity corporate consumers who have a fragmented/distributed electric load as it allows them to support the development of new renewable energy resources¹⁷ and can be scaled up if the corporate wishes to contract with more than one generator. The main attraction of VPPAs is that they provide predictability, remove volatility and cut costs related to electric expenses. A word of caution, however: Depending on the prevalent financial regulations in your applicable jurisdiction, VPPAs might be subject to derivative accounting rules.¹⁸

4. Advantages of CPPAs

- **Long-term investments in future energy consumption** – Corporates can make a long-term investment in relation to their future energy needs as CPPAs provide them room to maneuver in terms of their finances, as well as improving their CO2 balance.
- **Lowering the risk linked with investment in new assets** – Long-term electricity supply contracts guarantee that a corporate will be supplied by a particular energy supplier for an extended term (typically 5, 10 or 15 years) and, in doing so, this lowers the risk of investments in new assets, as well as reducing capital costs and increasing creditworthiness.
- **Bankability for new projects through securing a steady (bankable) revenue stream** – At a time of increasing volatility in the energy markets and forecasts of price rises in the coming years ahead, CPPAs provide access to long-term, predictable revenue streams for developers and lenders to obtain the finance needed for projects. CPPAs also enable buyers to fix prices in the long term enabling renewable energy projects to be bankable and to raise project financing.¹⁹ The ability to lower and fix electricity cost (whether via fixed or floor pricing structures) is a major part of the rationale for corporates. CPPAs, therefore, can also help fill the investment gap left by subsidy cuts or removal.
- **Higher prices when compared with conventional PPAs** – CPPAs typically provide higher prices compared with typical floor prices provided in traditional PPAs offered by electricity suppliers that historically have been risk adverse, offering either a floor price which is low when compared to the prevailing market price or no floor price at all. Consequently, they can be highly attractive to generators and their lenders who can take these higher fixed prices into account into modelling generation income and specifying terms of funding.

¹⁵ Innovation in Power Purchase Agreement Structures.

¹⁶ Clean Energy PPAs hit 8.6GW, Renewables.Biz, 12 August 2019, available at <https://renews.biz/54761/clean-energy-ppas-hit-86gw/>, accessed 3 January 2019.

¹⁷ Urban Grid, Quick Guide to Virtual Power Purchase Agreements, 11 February 2019, available at: <https://www.urbangridsolar.com/guide-to-virtual-power-purchase-agreements/>, accessed 5 January 2020.

¹⁸ Everoze, Your essential cribsheet to the top 3 corporate PPA models, February 2018, available at <https://everoze.com/ppa-models/>, accessed 5 January 2019.

¹⁹ Cutting through the complexity to unlock the potential, Smartest Energy Report November 2018.

5. Challenges for the CPPA Market

- **Finding investment grade off-takers** – According to Aurora, the CPPA market in Europe is limited to 60 GW of equivalent offshore wind capacity due to a lack of investment-grade companies willing to sign long-term supply deals. Good off-takers are characterized as those close to the end consumers with a good credit rating, a natural hedge or a need for price stability—and amongst corporate entities these attributes are rare (Aurora estimates that only 14% of industry demand is bankable and can absorb long-term power risk²⁰). The limited CPPA market left a lot of heavy lifting to be done by Europe’s energy utilities who had the customer numbers against which to hedge risk, alongside experience in managing merchant exposure.
- **Finding creditworthy developers and buyers** – Corporates typically expect developers to be able to post a letter of credit (LoC) or a credit-worthy Parent Company Guarantee (PCG) to cover the risk that the project fails to move forward after the CPPA is entered into. These are sometimes only preliminary hurdles as often, once the project is generating, the LoC or other security is released. Except in the case of large creditworthy corporate buyers, generators similarly will often require security to ensure the corporate buyer will pay for the electricity being delivered, especially considering the long-term nature of the CPPA. This is particularly important because, as a subsidy free project, the CPPA is likely to be almost the entire source of the generator’s revenue. Good, creditworthy corporate off-takers can be hard to find, however, and this remains a challenge.
- **Requirement for compatible supply arrangement from licensed suppliers** – It is critically important to find the right electricity supplier partner to arrange direct-supply agreements between low-carbon generators and corporates. Such supplier partners can often provide the expertise that the corporate lacks, such as administration, demand and supply balancing, Grid System Operator liaison.
- **Need for a supplier to provide balancing services to smooth intermittent renewable power** – A corporate might be required to pay a substantial premium for a utility to structure an offtake so as to take the intermittency risk out of the deal in order to get a baseload shape sleeve into their supply contract.
- **Agreeing price levels** – Prevailing market prices are a large factor/consideration for parties when entering into a CPPA. Generators looking to sign a CPPA at the time of low electricity prices may find it more difficult to secure the long-term pricing required for a project to be economically viable. Even when prices are expected to rise over the duration of the CPPA, a corporate may be unwilling to pay more in the short-term. Addressing the challenge of price setting has been key to establishing a standardized CPPA.²¹ Corporates will also have to develop a greater insight into their likely electricity demand over a longer period than they had previously considered.
- **Standardization** – As CPPAs vary in structure and length with the majority of debt structures for projects being in excess of 10 years in length, most corporates and energy management professionals are bound to lock-in energy costs at five or seven years at a time, rendering it difficult to find a middle ground in negotiations. Standardization of a CPPA form could establish common ground in negotiations to help broker these deals.²² The European Federation of Energy Traders (EFET) has launched a standard CPPA for physical and financial PPAs, with an election sheet approach allowing for tailoring of the agreement. This is the first standard CPPA valid for all European countries to bring down transaction costs and facilitate the negotiation process.²³ EFET has commented that its standard CPPA is supported by legal opinions in key jurisdictions, and is translated from English into other EU languages to encourage uptake across Europe.²⁴
- **REMIT reporting obligations** – Although the regulatory requirements for VPPAs are still being formed, the prevailing view is that these contracts are “swap” agreements and therefore, the generator and corporate buyer will need to consider their obligations under REMIT (Regulation on Wholesale Energy Market Integrity and Transparency), which includes reporting, recordkeeping and registration requirements for swap transactions.

20 Europe’s corporate PPA market “limited by creditworthiness”: analyst, *Platts European Power Daily*, 21 March 2019.

21 SmartestEnergy, “Cutting through the complexity to unlock the potential – Corporate PPA” Report, available at: <https://smartestenergy.com/info-hub/corporate-ppa-report-2019/>, accessed 15 January 2020.

22 Liam Stoker, Solar Power Portal, “Standardisation a ‘long way off’ from solving the ‘gulf’ in corporate PPA understanding” 31 January 2019, available at: https://www.solarpowerportal.co.uk/news/standardisation_a_long_way_off_from_solving_the_gulf_in_corporate_ppa_under, accessed 15 January 2020.

23 Re-Source Platform Website, available at <http://resource-platform.eu/>, accessed 2 January 2020.

24 EFET Launches standard corporate power purchase agreement, *Platts European Power Daily*, 20 June 2019.



6. Other Alternative Routes to Meet Corporates' Decarbonization Objectives

Apart from entering into CPPAs, corporate sustainability and procurement leaders can meet their decarbonization and emissions reduction objectives through various means, including energy efficiency measures, signing up to green tariffs when purchasing electricity from their electricity supplier, purchasing RECs to offset their non-renewable energy consumption and/or directly investing in a renewable energy project.

- **Energy efficiency** – Corporates may adopt energy efficiency measures, such as upgrading windows and insulation, installing more efficient lighting and equipment, installing motion sensors and other devices that power down equipment or facilities when not in use and installing systems to use off-peak energy instead of more expensive on-peak energy.
- **Green tariffs for power purchases** – Corporates may sign up to a “green tariff” when purchasing electricity from their electricity supplier, whereby the supplier procures enough renewable power to supply to the customer, mixing a portfolio of assets so as to ensure that the power supplied to the customer always balances that customer’s energy demand. This solution has various drawbacks, including that some of these assets could include fossil-fueled generators, coupled with a difficulty in tracing market-traded carbon offsets and RECs.²⁵ A further drawback to this solution is the lack of any direct link between the customer and the generator. These tariffs do not provide greater security of supply than traditional brown tariffs. Furthermore, the supply arrangements are typically entered into for periods of three to five years, so the customer does not secure long-term price protection from wholesale power price volatility.
- **Purchasing RECs from verified generators** – Corporates can offset their non-renewable energy consumption by purchasing RECs that renewable generators receive for generating clean energy. Purchasing RECs from verified assets can allow a corporate to claim that it is supporting the generation of power from renewable resources (this is not equivalent, but is somewhat similar to the manner in which a corporate can claim it is supporting lower emissions when purchasing carbon offsets in the carbon market). A corporate can enter an agreement to buy these RECs from generators, but purchases electricity from a licensed supplier or in the wholesale market. Alternatively, the certificates can be bundled together with the electricity under a PPA and linked with the corporates’ consumption requirements to verify that all power used comes from renewable sources.²⁶ The concept of certificates for evidencing the generation of renewable energy has also been introduced in a number of other countries, including the EU (Guarantees of Origin or “GoOs”), the US (Renewable Energy Certificates or “RECs”²⁷) and Australia (Large-Scale Generation Certificates or “LGCs”).

Example: In the UK, renewable electricity purchased from electricity suppliers is typically supported with Renewable Energy Guarantees of Origin (REGOs), providing confidence to customers that the electricity purchased is renewably sourced and can be reported with zero carbon emissions under the GHG Protocol market-based method. Although green customers secure their electricity through the national grid infrastructure, the electricity supplied is matched to REGOs allocated to the supplier – so the electricity bought is deemed to be 100% renewable energy. Some electricity suppliers even provide an enhanced transparency service whereby each megawatt of renewable power is matched to a named generating asset, which can also help underline the corporate off-taker’s commitment to sustainability.²⁸

²⁵ From boiler room to boardroom: optimizing the corporate energy mix – renewables can transform energy risk into value creation, EY report, 2014, available at: [https://www.ey.com/Publication/vwLUAssets/EY_-_Optimizing_the_corporate_energy_mix/\\$FILE/EY-Optimizing-the-corporate-energy-mix.pdf](https://www.ey.com/Publication/vwLUAssets/EY_-_Optimizing_the_corporate_energy_mix/$FILE/EY-Optimizing-the-corporate-energy-mix.pdf), accessed 2 January 2020.

²⁶ Global Renewable Hub, What are Green Certificates (or RECs)?, available at: <https://globalrenewablehub.com/renewable-buyers-guide/green-certificates>, accessed 5 January 2019.

²⁷ In the US, a further distinction needs to be made between mandatory RECs (i.e., those received by a public utility for meeting its statutory renewable energy requirements) and voluntary RECs (i.e., those created on a voluntary basis using a private organization like the nonprofit entity Green-e, which is recognized across the US renewable energy industry).

²⁸ SSE website, SSE Green Electricity, available at <https://www.ssebusinessenergy.co.uk/solutions-for-business/green-energy/>, accessed 2 January 2020.



- **Carbon offsets** – This refers to the process of compensating for every ton of CO₂ that a party emits by ensuring there is one ton less in the atmosphere. Corporates can balance out their own carbon footprints/future emissions by investing in carbon offset schemes, which are environmental projects around the world that can involve, for example, rolling out renewable energy technologies or soaking up CO₂ directly from the air through the planting of trees. Purchasing carbon credits from an emissions trading scheme can be a part of this strategy.
- **Direct investment in renewable energy projects** – Corporates may develop or invest directly in a renewable generating plant, from which the power generated can be transmitted to the corporate. However, such an approach often requires a high up-front investment cost (or financing cost) and requires the corporate to develop (or subcontract) significant energy expertise in order to construct, operate and maintain the project, and to meet all regulatory requirements. In addition, the greater the distance that such project is from the corporate's load center (i.e., where power is needed), the greater the transmission-related costs and potential complexities from a technical and regulatory perspective.

7. Authors' Conclusions

As subsidy-free renewable projects are becoming a reality (and arguably the norm), CPPAs are likely to continue to play an increasingly important role in helping projects achieve financing, as well as meeting corporates' long-term supply, energy cost and decarbonization goals. Ultimately, the price has to be right in order for them to continue to be seen as the preferred route to market for projects and long-term solution for corporates' electricity supply, but given the rapid increase in take up over the last few years, they do seem to indicate the direction of travel for the near future.

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