



# Understanding Renewable Energy Agreements

How to Evaluate the Financial and Environmental Implications of PPAs and VPPAs





# Contents

INTRO .....	3
<b>The Growing Demand for Renewable Energy and Power Purchase Agreements</b>	
PART 1 .....	4
<b>Defining PPA and VPPA Contract Structures</b>	
PART 2 .....	5
<b>Understanding VPPA Cash Flows</b>	
PART 3 .....	7
<b>Managing Risk in a VPPA</b>	
PART 4 .....	10
<b>How to Prepare for the VPPA Acquisition Process</b>	
CONCLUSION .....	11
<b>Key Takeaways</b>	

## INTRO:

# The Growing Demand for Renewable Energy and Power Purchase Agreements

As the need to reduce emissions grows for both utility and corporate buyers, renewable energy power purchase agreements (PPAs) and the related virtual power purchase agreements (VPPAs) are becoming increasingly popular. For organizations, these are among the most powerful tools for reducing Scope 2 greenhouse gas (GHG) emissions.

But increasing demand has created a more competitive landscape among PPA buyers, as [data from Bloomberg NEF](#) demonstrates. Global corporate PPA volumes reached a record-breaking 36.7 gigawatts in 2022, up nearly 500% from just 6.5 GW five years earlier in 2017. This trend has persisted even in the face of the massive challenges posed by the COVID-19 pandemic and subsequent supply chain disruptions.

And it's not just about large PPAs for corporate giants and utilities – small and mid-sized PPAs have also experienced sustained growth. The trend is expected to continue in coming years as more and more organizations adopt increasingly ambitious decarbonization targets and sustainability goals – and seek out new tools to reach them.

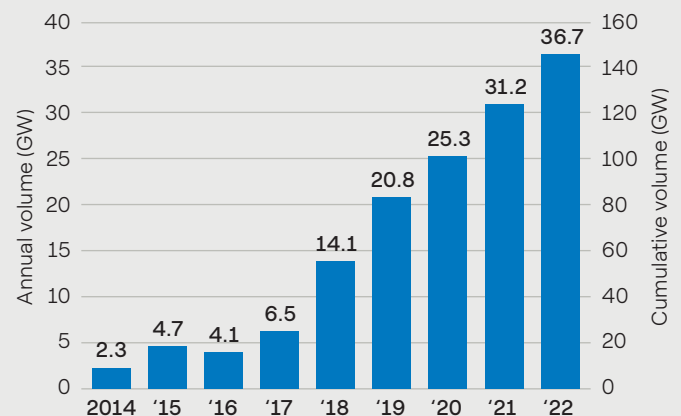
PPAs – whether physical or virtual – are vital to achieving carbon emissions reduction targets. One agreement can help organizations meet up to 100% of their decarbonization needs. As an experienced renewable energy project developer and solutions provider, Enel North America has prepared this guide to help organizations learn more about these agreements, as well as challenges and opportunities associated with them. The guide will:

- Introduce readers to these two types of agreements
- Discuss opportunities and challenges associated with them



## Global Corporate PPA Volumes

2014-2022



Source: BloombergNEF

## PART 1:

# Defining PPA and VPPA Contract Structures

A power purchase agreement (PPA) is a contract between a buyer and seller of electricity. A PPA defines terms like price per megawatt hour (MWh) and penalties for underperformance while outlining the logistics of delivery and financial settlement. Historically, PPAs were typically tools for buyers like utilities and occasionally major energy users. However, that has quickly changed in recent years as organizations across all industries have adopted the PPA structure.

Renewable energy PPAs are typically structured in one of two ways: physical PPAs or virtual PPAs. With a physical PPA, the project must be located either on-site or within the same region of the buyer's utility grid. The buyer contracts with a developer to purchase physical power and associated renewable energy credits (RECs). A REC represents the environmental attributes of 1 megawatt-hour (MWh) of energy produced from renewable sources.

RECs are used to prove renewable electricity use claims and, as market-based instruments, can be sold and exchanged in order to claim renewable energy use for carbon accounting.

Virtual PPAs (also known as VPPAs, financial PPAs and synthetic PPAs) are a variation on the typical PPA structure. In the case of a VPPA, the buyer never receives the physical electricity generated by the project under contract. It is because a VPPA is purely a financial transaction that delivers the environmental benefits of a renewable energy project to your organization, while electricity generated by the project flows to the grid. VPPAs do not change how organizations power their facilities, as they continue to work with their local utilities.

Because electricity is not physically exchanged, organizations' facilities do not have to be in the same region as the renewable energy project. Decoupling electricity load from the renewable energy project provides possibilities that are difficult to achieve in other ways, making VPPAs popular renewable energy solutions for commercial and industrial organizations.

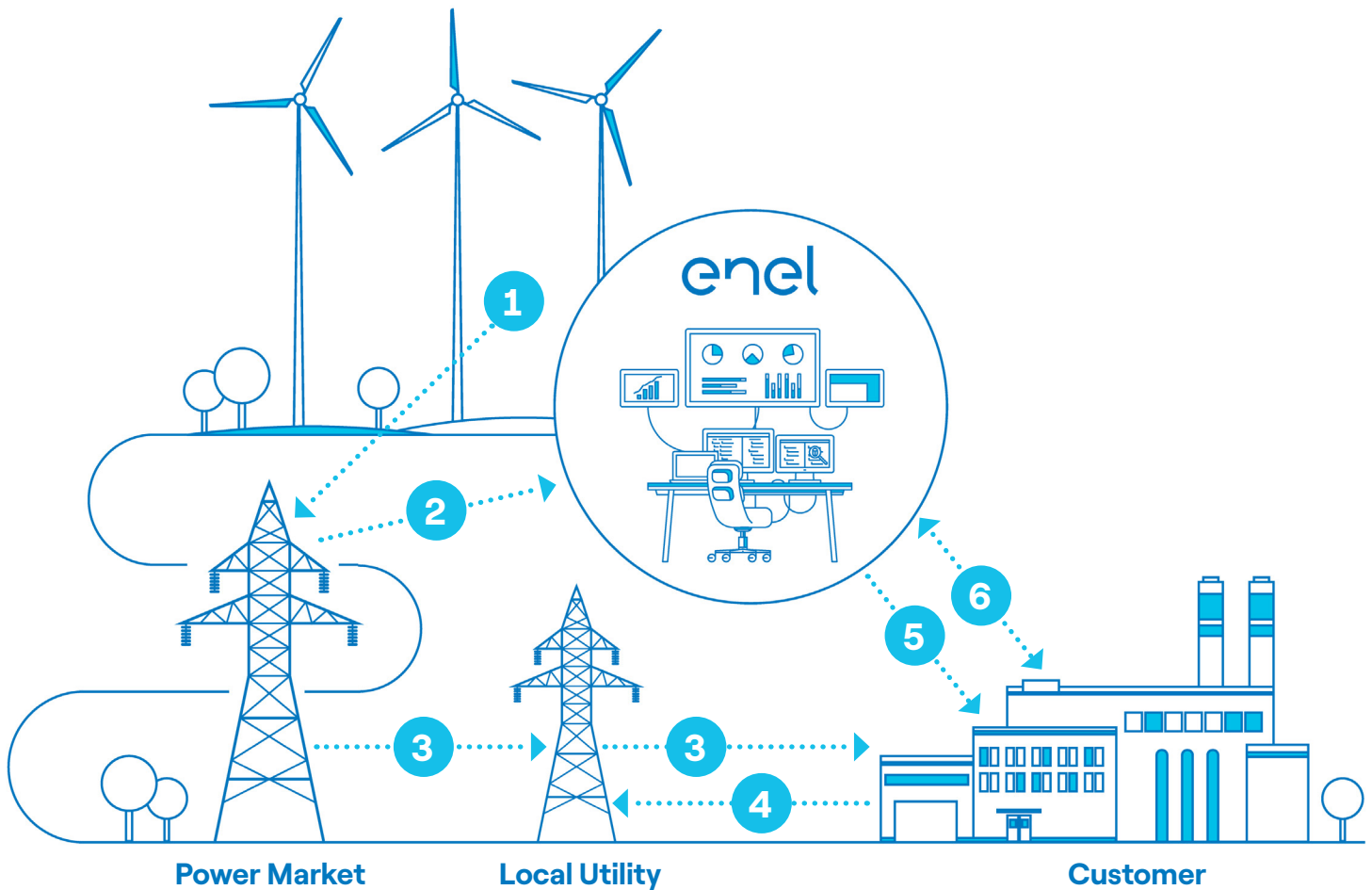
While both contract structures help buyers achieve significant emission reductions, there are differences in the geographic flexibility, accounting implications, and project linkage, as detailed in the chart below.

	Physical PPA	Virtual PPA
<b>Energy Settlement</b>	The buyer receives and takes the title to the physical energy and is responsible for coordinating delivery and scheduling	None (strictly financial)
<b>Financial Settlement</b>	The buyer agrees to a fixed price (including RECs) through the supplier or paid directly to the seller	Contract-for-differences settled directly with the seller
<b>Geographic Flexibility</b>	Limited to on-site projects or those residing within the regional grid footprint	More flexibility – projects can reside within the United States
<b>Project Linkage</b>	Strong – direct match of project production with the customer's facility usage	Not as strong – no physical delivery

## PART 2:

# Understanding VPPA Cash Flows

The figure below outlines the steps involved once the project is built and energy starts flowing into the grid.



- 1** Renewable energy is sold into the power market
- 2** The power market pays the current market price
- 3** Electricity is delivered to the customer via the local utility

- 4** The customer pays the utility for the electricity (as before)
- 5** RECs are transferred to the customer
- 6** The difference is settled between the contract price and the current market price

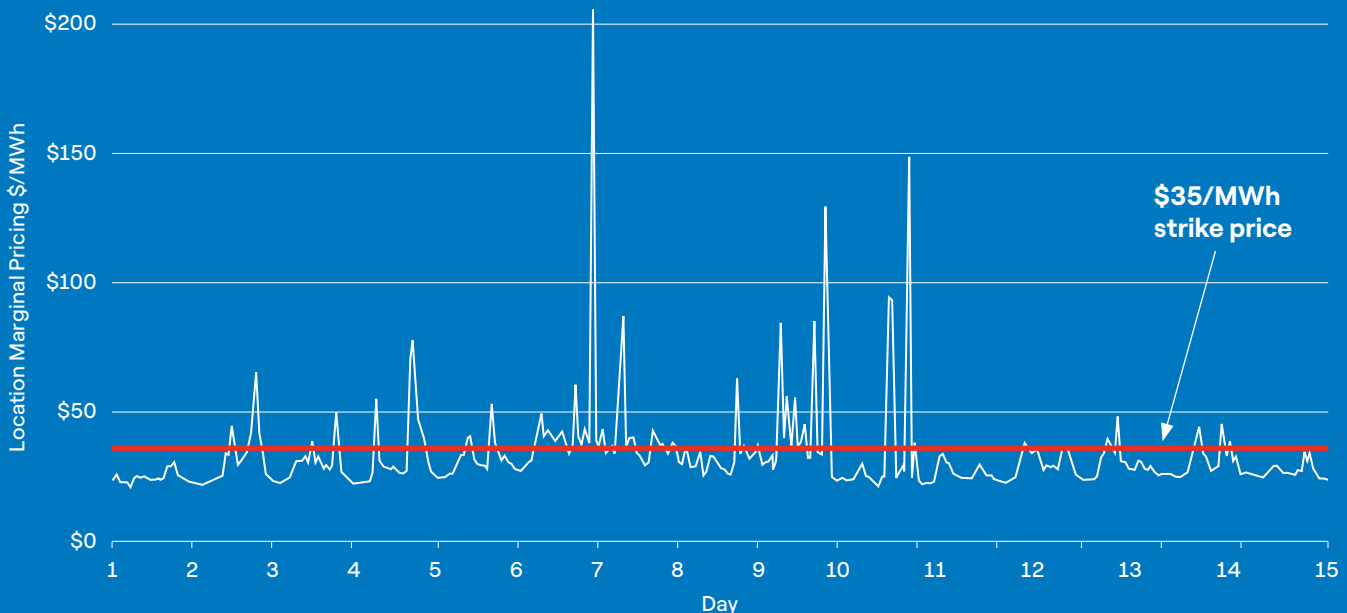
## Monthly Settlement

VPPAs include a strike price – the price per MWh the buyer agrees to pay the project owner – which is marked against a specific wholesale market delivery point. The difference between these two prices is multiplied by the MW generated that month to get the monthly settlement value.

$$\text{Settlement} = (\text{Wholesale rate} - \text{Strike price}) \times \text{MW}$$

The red line on the graph below represents a \$35/MWh strike price for a VPPA. Please note that this number is strictly for example purposes; strike prices vary widely from project to project based on a variety of factors. VPPAs often settle against hourly grid power prices – when those prices are above the strike price, the seller credits the buyer. When the prices are below the strike price, the buyer must pay the seller. These payments represent the financial settlement of VPPAs, which generally occur monthly.

### Example Contract for Differences (CFD)



Please note that \$35/MWh is strictly for example purposes; strike prices vary widely from project to project based on a variety of factors.

## REC Receipt and Retirement

As part of the settlement transfer, the renewable energy certificates (RECs) are also transferred to the customer. The [EPA](#) defines a REC as a “market-based instrument that represents the property rights to the environmental, social and other non-power attributes of renewable

electricity generation.” The value of the received RECs depends on the market the project is in and the type of RECs to be received by the buyer (either voluntary or compliance)<sup>1</sup>. Variation in REC value should be considered when evaluating the economics of a VPPA.

<sup>1</sup> The compliance REC market is created as a result of legislation like renewable portfolio standards (RPS) in certain regions; compliance RECs are often more expensive because they have stricter criteria attached to them. In contrast, the voluntary REC market is typically for corporations or individuals looking to achieve sustainability goals beyond RPS mandates.

## PART 3:

# Managing Risk in a VPPA

Think about a mortgage. Some people choose a fixed rate that will make their payments predictable. Others prefer an interest rate structure that is more variable. Either option could turn out to be financially beneficial or costly, depending on how housing prices and mortgage rates change during the length of the mortgage. This simplified example mirrors the way that risk needs to be assessed and managed with a VPPA contract.

There are five essential areas in a VPPA solution where risk needs to be understood and considered.

## 1 The Renewable Plant Owner-Operator

Ideally, the owner-operator of the renewable energy plant develops, builds, and operates the plant for the long term, as this can help eliminate some risk. Many organizations place priority on project execution risk or the reputation of the owner/operator. Larger renewable energy companies that are both owners and operators are usually considered lower risk suppliers.

Since the energy from the renewable facility is not physically delivered to the buyer, the plant can be built in the optimal location to maximize the renewable resource. Besides the renewable resource (wind or solar), project siting factors include the weather, community support, access to open electricity markets, and physical space. It's worth remembering that large open spaces allow larger solar or wind farms to be built. Larger plants bring greater economies of scale, with lower construction and operating costs. All other things being equal, that means lower prices for customers too.

## 2 The Wholesale Power Market

As mentioned earlier, the electricity generated under a VPPA contract isn't physically delivered to the buyer. Instead, it's sold into the regional wholesale electricity market. Fortunately, many of the Midwest states and some Southern states that have strong wind and solar resources also have open wholesale markets. These markets include ERCOT (covering most of Texas), and the Southwest Power Pool (including all or part of 14 Midwest states).



### 3 The Buyer

In the past, the VPPA was a tool used exclusively by large tech companies to buy renewable energy. In recent years, organizations from other industries have begun using VPPAs to meet their decarbonization targets and sustainability goals. T-Mobile and Mondelēz are two of many companies that have worked with Enel to create partnerships which have led to new renewable energy projects being developed and constructed (see below).

Partly this reflects a growing stakeholder demand that organizations become more sustainable. There are overarching environmental, social, and governance

(ESG) factors that are recognized as being the foundation of a healthy long-term business. [Studies](#) show that organizations are likely to be more resilient and profitable if they are managed for the long term and in line with key societal trends, such as climate change. This trend also reflects a growing maturity of renewable energy suppliers – including Enel – to offer a broader range of solutions. For example, many suppliers now offer solutions with different financial terms (including risk), solutions more suitable for smaller loads, or solutions that are a better fit for organizations with hundreds or thousands of locations.

#### T-Mobile

T-Mobile is the first nationwide U.S. wireless carrier to commit to sourcing 100% renewable electricity. After all, making bold commitments is what the company is known for. Partnerships including the agreement with Enel at the Red Dirt wind farm near Hennessey, Oklahoma have T-Mobile on its way to reaching its renewable energy goal. The wireless operator partnered with Enel in 2017. The agreement is a VPPA for 160 MW from Enel's Red Dirt wind project. This was T-Mobile's first wind project, spanning 60,000 acres (94 square miles). The company was faced with a widespread footprint of stores and limited space for on-site projects. So, the VPPA became a key part of the company's strategy. By leveraging the flexibility of VPPAs, T-Mobile has been able to make rapid progress toward being 100% renewable.



Red Dirt wind farm



Roadrunner solar farm

#### Mondelēz

Mondelēz International is a global snacking leader known for brands like Oreo and Toblerone. Through its partnership with Enel at Roadrunner solar farm in Texas, which began in 2019, Mondelēz International is well on its way to reaching its ambitious sustainability objectives and reducing its environmental footprint. Its 12-year contract is for 65 MW of a Texas solar plant. A member of the Science Based Targets initiative, the company is committed to cutting greenhouse gas emissions by 10% by 2025. By procuring 65 MW from Enel's 497 MW Roadrunner solar plant, Mondelēz was able to reduce CO<sub>2</sub> emissions by 80,000 metric tons.



## 4 The Contract

As noted earlier, a VPPA is a financial contract, and sometimes it's also referred to as a contract for differences (CFD). That's because the flow of money from the settlement depends on the difference between a fixed strike price and a variable market price. Here's how it works:

1. The buyer and plant owner agree on a fixed price per megawatt hour (MWh). Let's use \$35 per megawatt hour for this example.
2. The plant owner sells the electricity into the wholesale electricity market as it's generated. That market is open, transparent, and competitive. So, the price received per MWh will vary. During times of high electricity demand, the price received per megawatt hour will be high. When demand is low, the price will drop. Market prices are determined by classic economic supply and demand just like the stock market or in real estate.
3. The contract for differences guarantees that the plant owner will always receive \$35 per megawatt hour (in this example). So, if the market is only paying \$30 per megawatt hour, the buyer owes the plant owner \$5. Conversely, if the market is paying \$40 per megawatt hour, the plant owner owes the buyer \$5.
4. The RECs associated with the energy produced are transferred to the buyer.

That's it – in its simplest form. The renewable electricity, money, and REC flows are illustrated conceptually in the [figure on page 5](#). In practice, each buyer has unique needs and the VPPA contract is flexible enough to be customized for each buyer.

A large, experienced renewable energy supplier can offer many forms of a VPPA. Companies like Enel with a hedging and commodities trading team can also offer hedged power purchase agreements (HPPAs). Leveraging HPPAs is a way to eliminate financial risk, while taking advantage of the environmental benefits associated with RECs. In summary, renewable energy purchases can be simplified and made less risky, if the buyer chooses the right partner and contract structure.

## 5 Environmental, Social, and Governance (ESG) Considerations

Clean energy buyers are no longer focused exclusively on the short-term P&L impacts of the agreement. Renewable energy projects are often judged on more than just price and could face added scrutiny from stakeholders if they don't include and place emphasis on nonfinancial considerations. Such considerations may include minimizing environmental disturbance, carbon impact of technology involved, or environmental stewardship in the way projects are built and run.

Another consideration is whether renewable energy developers invest in the economic and social development of communities where they operate. Commercial and industrial organizations committed to sustainability and a just clean energy transition may prefer projects that aren't the lowest priced option, if they integrate environmental and social impact in line with their sustainability goals. For many organizations, buying renewables through a VPPA isn't just about adding new renewable energy to the grid. It's about making a bold commitment to sustainability that reflects upon their brand and business values.



## PART 4:

# How to Prepare for the VPPA Acquisition Process

The VPPA acquisition process takes time and entails far more than the economic assessment. Organizations need to ensure that they have well-defined decarbonization targets and overall sustainability goals before they jump in. This will help them define the kind of renewable energy, contract structure, and energy partner they need to choose.



## Strategy, Wish List, and ESG Considerations

PPAs are typically part of a broad, ambitious strategic renewable energy plan. To ensure success, parties should engage all stakeholders in developing a set of sustainability and renewable energy goals. In constructing a VPPA wish list, organizations should outline their specific needs and develop a timeline. They should understand their financial and risk requirements and limitations.

Renewable energy projects are now judged on more than just price. Many organizations have strong ESG

preferences, and these should be integrated into their wish list. If focused solely on price, organizations may end up selecting a project that is not right for their needs.

## Contract Execution and Integration

Once the renewable energy project is selected, the buyer and developer will begin establishing the definitive terms of the agreement. This is typically a 6-to-8 month process, depending on resource availability. Once projects reach commercial operations, buyers should manage RECs to ensure proper receipt, certification, tracking, and retirement.

## CONCLUSION:

# Key Takeaways

As organizations of all sizes begin to explore PPAs and VPPAs, gaining a deeper understanding of the value and risk of these tools is essential for evaluating contracts. Here are three key takeaways for readers:

# 1

## **PPAs and VPPAs can help organizations meet their decarbonization targets quickly and efficiently.**

Both contract structures help buyers achieve significant emissions reductions. However, geographic flexibility provides possibilities that are hard to achieve in other ways, making VPPAs a very popular renewable energy solution.

# 2

## **It is critical to establish clear organizational objectives, targets, and requirements for VPPAs.**

Understanding your organization's unique energy, decarbonization and sustainability goals, as well as a financial and risk profile, can help you make your VPPA acquisition experience easier and ensure that it meets your needs and aligns with a longer-term strategy.

# 3

## **It's important to use risk mitigation strategies and choose the right renewable energy partner and contract structure.**

VPPAs are typically long-term commitments being made in traditionally fluid energy markets. However, choosing the right renewable energy partner can make the transaction easier and less risky. In addition to owning and operating the project over its lifetime, a large, experienced renewable energy company can offer a contract structure that will meet your organization's unique needs and appetite for risk.



PPAs and VPPAs are powerful tools for helping to cut greenhouse gas emissions quickly and efficiently. Enel's renewable energy experts ensure that our corporate customers maximize the value of their PPA. For more information on PPAs, VPPAs, and renewable energy, please [contact us](#).