

THE ABCs OF POWER PURCHASE AGREEMENTS

Compare the leading types of Power Purchase Agreements (PPAs) to meet renewable energy goals with the desired amount of financial risk.



Shell
ENERGY

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POWER PURCHASE AGREEMENTS

Renewables were the only energy source for which demand increased in 2020.¹

INTRODUCTION

Despite the COVID-19 pandemic, its economic ramifications, and other mitigating factors, corporations used Power Purchase Agreements (PPAs) to procure a record-setting 23.7 GW of clean energy in 2020. Over 130 companies signed PPAs worldwide, with the U.S. leading the pack and accounting for 13.6 GW of the total volume.² Meanwhile, consumption of all other fuels declined.³

What is driving the surge of interest in PPAs? Answering this question requires an understanding of PPAs and the unique role they play in the energy transition.

EVOLUTION OF THE U.S. RENEWABLE ENERGY MARKET

1970s-80s

The energy crisis, in which oil embargoes skyrocketed fuel prices and highlighted U.S. dependence on foreign oil, brought the need for more renewable, domestically produced energy to public attention, leading to the passage of the Public Utility Regulatory Policies Act of 1978 (PURPA). PURPA made the first provisions for Power Purchase Agreements, which allowed qualifying generation facilities to sell wholesale renewable energy to investor-owned utilities. PURPA PPA success helped prompt the restructuring of certain U.S. energy markets.⁴

1990s

Observations of climate change prompted a series of state and federal mandates encouraging investments in clean energy generation, including the first wave of renewable energy requirements, introduction of Renewable Portfolio Standards (RPS) and the earliest iterations of retail green power programs.⁵

2010s – Current

Prompted by regulatory mandates, public demand, and internal principles, commercial and industrial organizations increasingly seek out RECs as a means of demonstrating operational sustainability. To satisfy demand for RECs, variations in PPA terms are introduced to help increase availability and expand renewable generation capacity.

2000s

Certification and standardization of tradable Renewable Energy Certificates (RECs) established a new type of “currency” within the power market, providing an accurate, traceable record of energy produced and a fungible commodity that can be traded among suppliers or businesses that seek to participate in renewable projects and meet mandated or voluntary renewable energy targets.⁶

Now, PPAs are the leading mechanisms through which commercial and industrial energy buyers reduce reliance on fossil fuels, curb Scope 2 emissions⁷, procure RECs, meet compliance mandates, and signal their action against climate change to both internal and external stakeholders. In light of mounting pressure from investors, consumers, the regulatory environment, and international standards such as the Paris Agreement, renewable energy purchases through PPAs make business sense for many corporate, commercial, and industrial facilities.

However, not all PPAs are created equal, and contract provisions vary. To inform business energy strategy and help accelerate corporate progress on emissions reduction, this white paper outlines the key similarities, differences and challenges associated with of the most widely available types of PPAs.

¹ <https://iea.blob.core.windows.net/assets/18a6041d-bf13-4667-a4c2-8fc008974008/RenewableEnergyMarketUpdate-Outlookfor2021and2022.pdf>

² <https://about.bnef.com/blog/corporate-clean-energy-buying-grew-18-in-2020-despite-mountain-of-adversity/>

³ <https://iea.blob.core.windows.net/assets/18a6041d-bf13-4667-a4c2-8fc008974008/RenewableEnergyMarketUpdate-Outlookfor2021and2022.pdf>

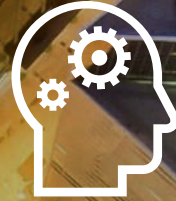
⁴ <https://provost.gwu.edu/historical-overview-ppa>

⁵ <https://www.epa.gov/greenpower/history-voluntary-markets>

⁶ https://www.epa.gov/sites/production/files/2016-03/documents/background_paper_3.pdf

⁷ https://ghgprotocol.org/scope_2_guidance

PART 1. **EXPLANATION** **OF PPA TYPES**



COMPARING THE TYPES OF PPAs AVAILABLE TO COMMERCIAL AND INDUSTRIAL ENERGY BUYERS

PHYSICAL/VIRTUAL PPAS

There are two types of PPAs available to energy buyers, physical PPAs and virtual PPAs. Both types share key similarities. Each provides the project developer with commitments needed to support financing for developing, building and maintaining a renewable energy project and the energy buyer with title to RECs for offsetting their scope 2 emissions (along with an "Additionality" - when an organization's PPA/VPPA or Retail Delivered PPA has the direct effect of adding new renewable energy generation to the grid claim when eligible); both are wholesale transactions settled at an agreed delivery location (not directly associated with energy delivered to a retail meter).

THE ONE KEY DIFFERENCE BETWEEN THE TWO TYPES IS HOW THEY SETTLE:

In a physical PPA, the energy buyer pays an agreed fixed price (sometimes with agreed escalators) for each MWh generated from the PPA asset and takes title to both the energy and Renewable Energy Credits (RECs), while in a VPPA, the energy buyer receives or must pay the difference between and agreed fixed price (sometimes with an agreed escalator) and an agreed index for each MWh generated from the PPA asset and takes title only to the RECs.

Many businesses have taken advantage of physical and virtual PPAs to reduce reliance on fossil fuels and acquire RECs since this procurement option began to take off in 2013. Nevertheless, these types of PPAs have significant limitations to be aware of:⁸

Long-term contracts: PPAs tend to be 10-20 years in length requiring significant commitment and investment-grade credit.

Large volume commitment: PPAs often require volume commitments that exceed a buyer's needs.

Financial exposure and P&L volatility

Fixed vs floating market price: As described above, a PPA/VPPA locks in a fixed price for energy and RECs purchased from the renewable energy project. The customer then owns the exposure between the agreed fixed price for their PPA/VPPA and the index which the energy is settled at in the case of a VPPA or the market value of the energy they take title to in the case of a PPA. At times this can create a situation where the market or settlement value of the energy received is lower than the fixed price paid. The opposite, however, can also occur.

Locational Basis:

1 - The fixed price paid for energy generated from the PPA/VPPA may differ from the value of energy being procured at the customer's consumption locations (load) it is meant to offset, leaving the PPA/VPPA off-taker exposed to the difference.

2 - This locational basis can be exacerbated with renewable resources since they generate at the same time, regardless of load requirements, creating supply and demand imbalances and risk of curtailment.

⁸ <https://www.epa.gov/greenpower/physical-power-purchase-agreements-physical-ppas>

COMPARING THE TYPES OF PPAs AVAILABLE TO COMMERCIAL AND INDUSTRIAL ENERGY BUYERS

Hourly Risk: Although the PPA/VPPA production may closely match the load it is meant to offset on an annual basis, production vs load on an hourly basis can have large variations (i.e., sun only shines during the day). Since the value of energy is different by hour of the day, the off-taker is exposed to the difference in price when generation exceeds or falls short of the load it is meant to offset. In addition, for periods where renewable generation is low and falls short of the load it is meant to offset, energy prices can be higher than average due to low renewable generation vs grid demand (renewable resources generate together without regard to grid demand).

Production versus Load Volume Risk: The PPA/VPPA production may not closely match the load it is meant to offset on daily, monthly, annual, etc. intervals through the duration of the VPPA/PPA. The off-taker is left with fixed price versus current market price exposure for the net excess/shortfall in production versus the customer load over these intervals.

Sizeable volume commitment requirement: Off-site renewable projects are generally large in scale requiring the off-taker to have significant load to support development of the project or to coordinate with multiple off-takers to simultaneously contract with the developer.

Operational risk: If the renewable project fails or encounters technical difficulties, the off-taker bears the risk.

Wholesale Requirements for PPA: Wholesale licensing and/or wholesale schedule coordination's services are typically needed to accept title to physical power.

Multiple counterparties/bills: Since PPAs/VPPAs do not deliver energy to the customer's meter, settlement is separate from the local utility/retail energy supplier invoicing process.

COMPARING THE TYPES OF PPAs AVAILABLE TO COMMERCIAL AND INDUSTRIAL ENERGY BUYERS

SHELL ENERGY'S SIMPLIFIED RISK MITIGATING SOLUTIONS

Shell Energy's retail-delivered physical PPA offers many of the benefits of both standard and Virtual PPAs combined with the simplicity of a retail energy supply contract.

Instead of a complicated process in which the customer separately buys electricity and associated RECs from a renewable project and physical electricity from a utility/retail energy supplier, the retail-delivered physical PPA solution delivers power directly to the customer at a fixed price for all hours eliminating operational, hourly, location-based, and net excess/shortfall production risk.

Shell Energy North America is the third largest energy trader in North America, according to Platts' Power Sales Analysis, 2021. Shell Energy manages the offtake from the asset to the end user. After we offtake the energy, we deliver load-following energy to the customers' meter with the PPA project RECs bundled in, while preserving and passing through eligibility for an additionality claim when sourced from a new project.

Since these solutions are delivered through a retail supplier, there is more flexibility on power contract terms, consumption profile, and product structures. Additionally, Shell Energy is uniquely positioned thanks to its unparalleled industry knowledge backed by our energy trading arm, Shell Energy North America, and their extensive capacity, and strong balance sheet.

These agreements are available in deregulated markets with access to retail choice. In many cases, a retail-delivered PPA offers a more streamlined alternative to PPAs/VPPAs, and helps corporate energy buyers better manage financial resources and risk without compromising on sustainability.

In deregulated markets, an integrated solution developed by Shell Energy combining a physical PPA (Power Purchase Agreement) with a retail supply agreement offers unique benefits.

**IN MOST CASES,
A RETAIL-DELIVERED
PPA OFFERS A MORE
STREAM-LINED
ALTERNATIVE
TO PPAS/VPPAS**

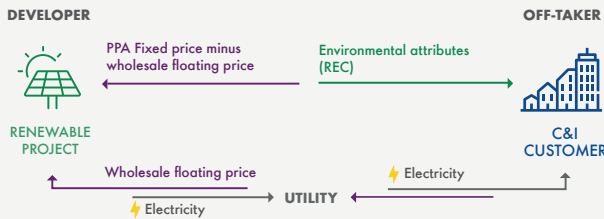


PART 2. **PPA** **COMPARISON** **CHART**



PPA COMPARISON CHART

Wholesale Physical/Virtual PPAs



Shell Energy's Retail Delivered Renewable PPA



Complex wholesale transaction with 12 + year contract terms

Simplified retail contracting structure with flexible terms and shorter lead times

As generated financial transactions, not physical-delivered energy

Firm physical energy delivered to load zone / customer's meters

Customer wears price risk associated with congestion, location and shape risks

Customer receives fixed price energy at all hours

Financial transaction with as generated RECs

As generated RECs from project with option to firm with non-project RECs

	FIXED PRICE	BALANCING POWER NOT REQUIRED	SINGLE BILLING OPTION	PROJECT-BASED REC TRANSPARENCY	DOES NOT REQUIRE KNOWLEDGE OF WHOLESALE ENERGY MARKET	CONTRACT LENGTH	RISKS TO BUYER
STANDARD PPA	✓	✗	✗	✓	✗	Long - 10-20 Years	Wholesale market risks; operational risk if renewable project is compromised.
VIRTUAL PPA	✓	✗	✗	✓	✗	Long - 10-20 Years	Financial risks: will likely require purchase of balancing power.
RETAIL-DELIVERED PHYSICAL PPA	✓	✓	✓	✓	✓	Flexible	Technical, financial risks mitigated.

ABOUT SHELL ENERGY

Shell Energy offers a comprehensive suite of tailored products and solutions, including: rapidly growing capacity, trading and technical expertise and smart energy solutions, serving customers across the commercial and industrial sectors. With the scale and expertise of Shell behind us, we're a global leader in innovation across the entire energy value chain – from generation, trading, supply, to behind-the-meter solutions. Shell Energy is your guide, making it easier to manage day-to-day energy needs while increasing efficiency, reducing cost, and advancing your decarbonization goals. Shell Energy has the resources and vision to meet the evolving energy needs of customers today and tomorrow, working toward a better energy future.

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