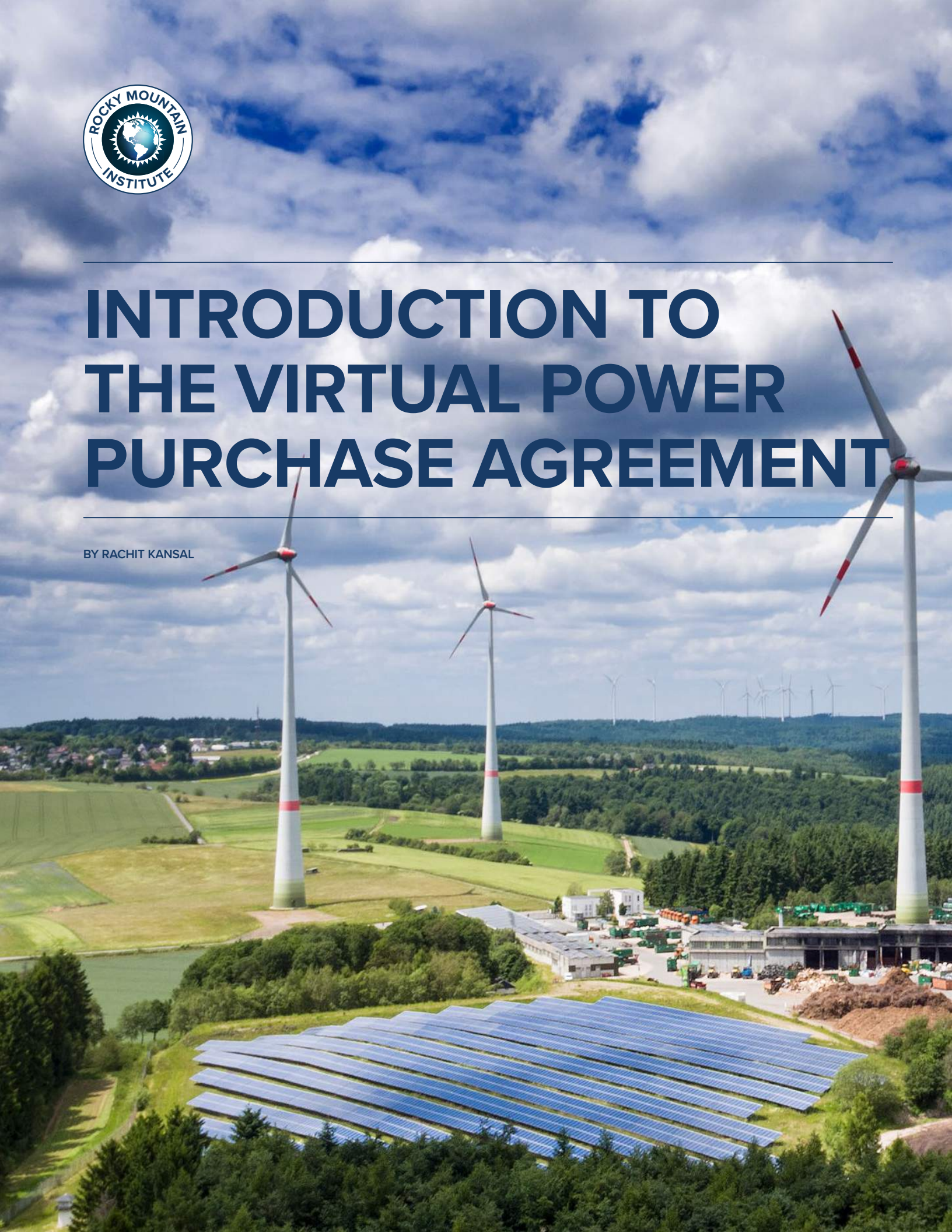




INTRODUCTION TO THE VIRTUAL POWER PURCHASE AGREEMENT

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ABOUT US



ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.



ABOUT THE BUSINESS RENEWABLES CENTER

Rocky Mountain Institute's Business Renewables Center (BRC) is a member-based platform that streamlines and accelerates corporate purchasing of off-site, large-scale wind and solar energy. With over 250 members, including major corporations, leading renewable energy project developers, and transaction intermediaries, the BRC embodies the know-how of the industry. Today, BRC members account for over 13 gigawatts of renewable energy, and more than 98% of US corporate renewables deals to date have included a BRC member. With a goal to help corporations procure 60 gigawatts of renewable energy by 2030, the BRC is at the leading edge of the fastest-growing sector of renewable energy procurement. More information on BRC can be found at <http://www.businessrenewables.org>.

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This paper serves as an introduction to the virtual power purchase agreement (VPPA)—its place in the off-site renewable energy procurement market, how the VPPA works, and why VPPAs have been a popular instrument in the United States thus far. This paper is aimed at renewable energy buyers who are seeking to understand the VPPA mechanism.

There are two types of off-site power purchase agreements (PPAs) in the market:

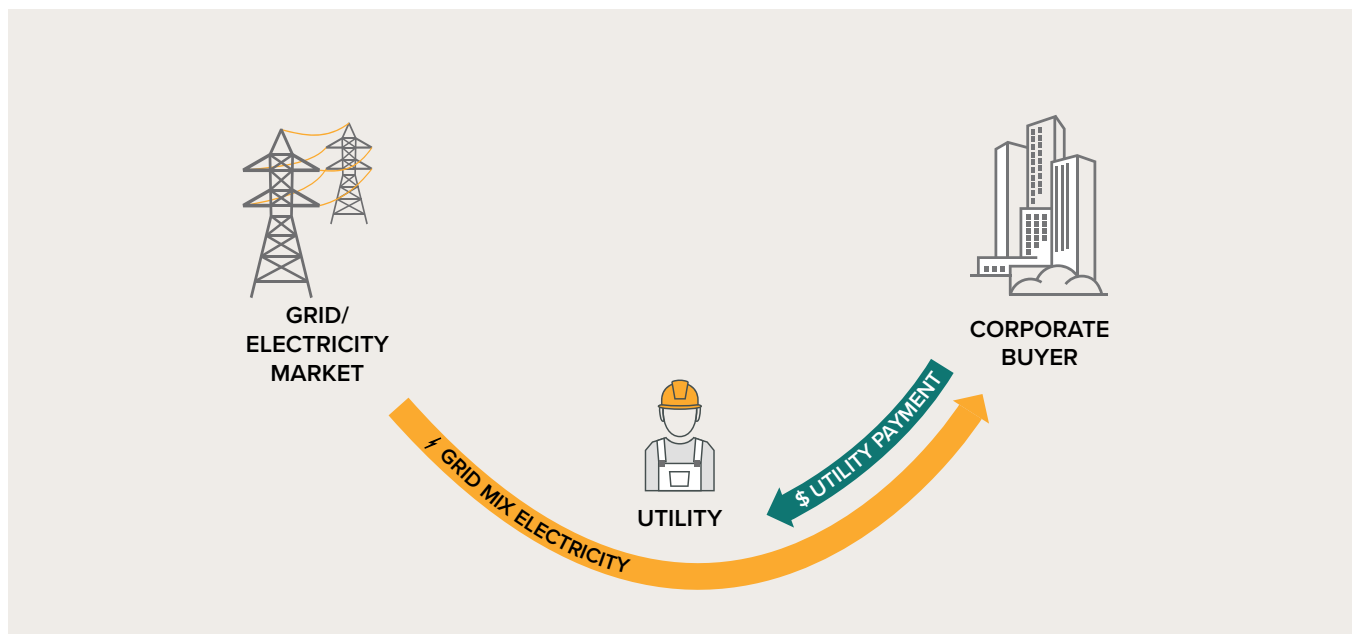
1. Physical PPA—Within a physical PPA contract, the corporate buyer takes ownership of the electrons produced by the renewable energy project. This transaction places responsibility on the buyer for monetizing/selling the electrons, which is typically

achieved by selling them into the wholesale electricity market. Depending on the contract structure, the buyer could also pay for transmission charges.¹

2. Virtual PPA—Within a VPPA contract, the corporate buyer does not own and is not responsible for the physical electrons generated by the project. The VPPA is purely a financial transaction, exchanging a fixed-price cash flow for a variable-priced cash flow and renewable energy certificates (RECs).² Because the VPPA is purely financial, the buyer still needs to meet its electricity load through traditional channels—therefore, the VPPA means the buyer’s relationship with its utility at the retail level remains unchanged (see Figure 1).³

FIGURE 1

UNDER A VPPA, THE BUYER CONTINUES TO CONSUME AND PAY FOR ELECTRICITY AS USUAL



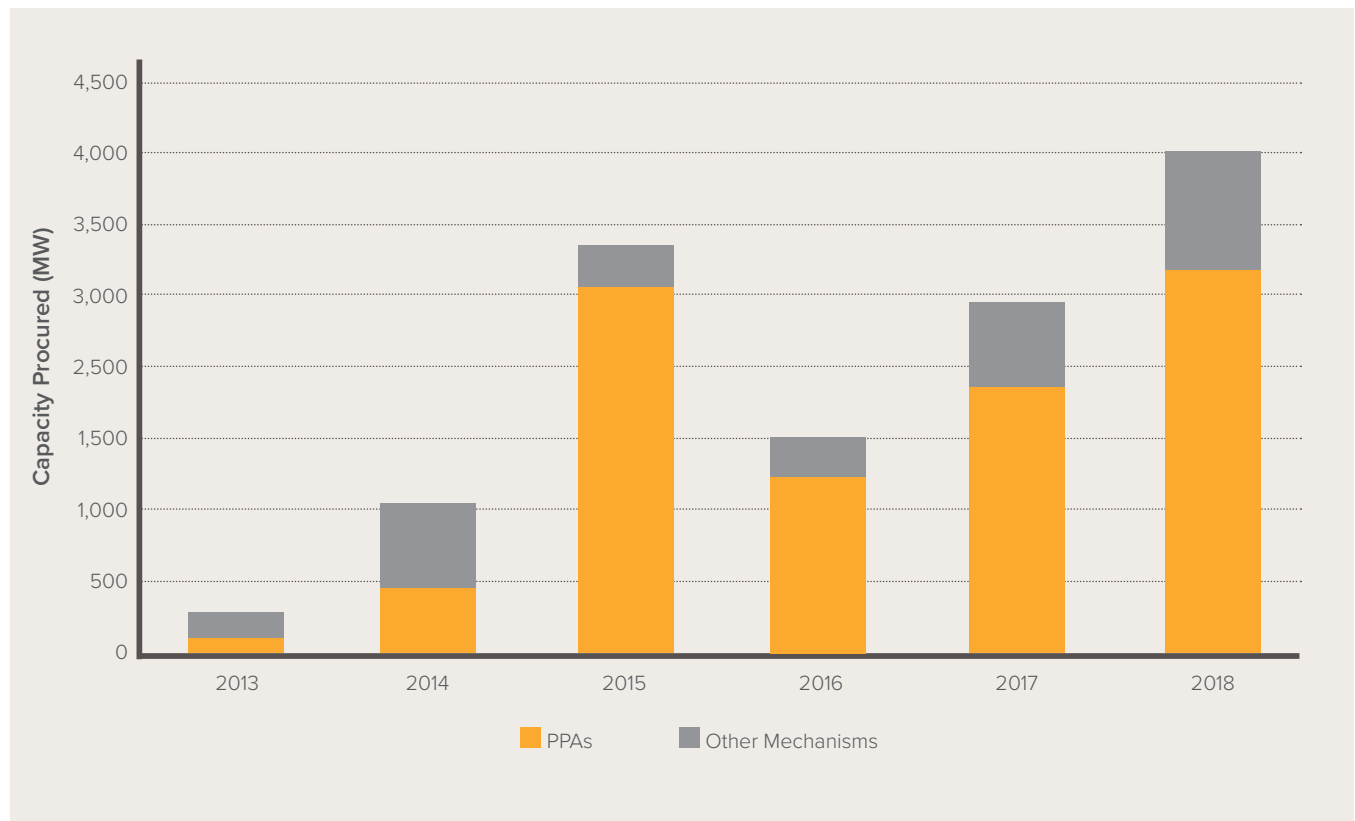
¹ For a more detailed review of physical PPAs, refer to the Business Renewables Center’s (BRC’s) “Deal Structure Primer” on the online member portal. Contact BRC staff for more information.

² To read more about what RECs are and how they work, see: <https://www.wri.org/publication/bottom-line-renewable-energy-certificates>.

³ An exception to this is found with large corporate buyers that purchase their electricity from wholesale markets.

Physical and virtual PPA contract types, taken together, are the dominant transaction mechanism in the corporate renewable energy procurement market today. Figure 2 demonstrates this by showing the annual purchases of new renewable energy in this market, comparing the combined PPA types to other mechanisms for large-scale, off-site procurement.

FIGURE 2
TRANSACTION MECHANISMS FOR CORPORATE PROCUREMENT OF NEW RENEWABLE ENERGY IN THE UNITED STATES



One key reason both PPA types have been so successful is because they allow corporate buyers to demonstrate a direct link between their actions and new renewable energy generating capacity. When buyers sign long-term contracts guaranteeing the price for renewable electricity (more on this later), they act in the role of “guaranteed offtaker,” an essential element to enable financing for new renewable energy projects.

For background, the physical PPA was the dominant form of transaction in the early years of the corporate renewable energy market, as the companies procuring energy then typically had very large energy needs and were sophisticated energy managers in their own rights. The virtual PPA has gained prominence in the past few years and is the fastest-growing transaction structure today, allowing smaller buyers and those companies without energy trading expertise to participate. The VPPA has enabled many companies to make quick and significant progress toward ambitious renewable energy goals.

VPPAs are easily scalable and enable buyers to satisfy a large portion of their sustainability goals with a relatively small number of deals. For example, Fifth Third Bank was able to meet its 100% renewable energy goal with just one VPPA.⁴ Also, because VPPAs are purely financial transactions, they allow buyers that have highly distributed electricity load—or load in regulated markets—to meet their renewable energy goals quickly and efficiently.

Step-by-step example: Company X is a large, New York–based IT company seeking to execute a VPPA.

Company X learns that it can execute a VPPA in any deregulated market in the country.⁵ Company X also knows it will continue to pay its electricity bill to its New York utility, as always.

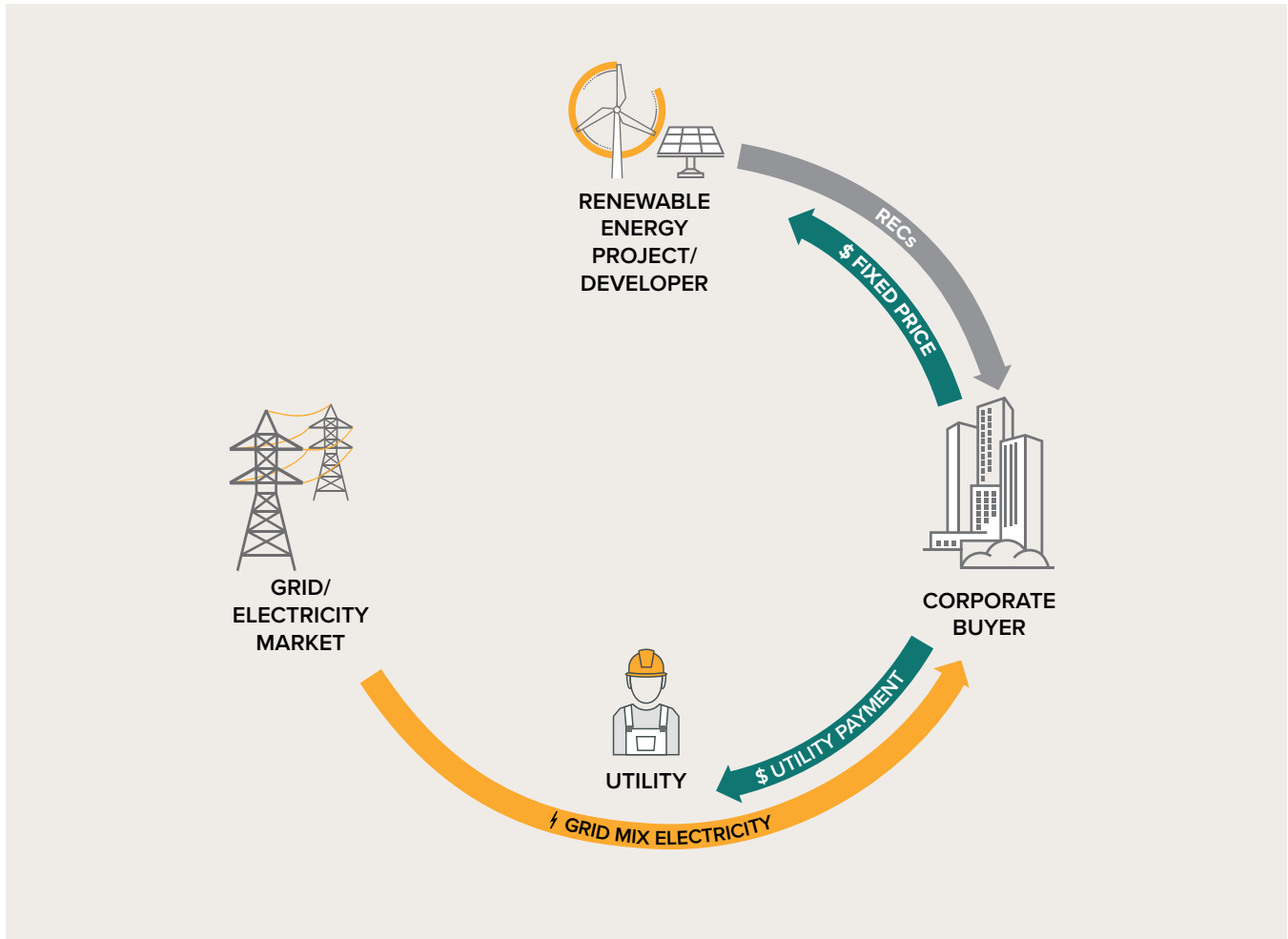
Company X is told the VPPA mechanism is simply a bilateral contract between the buyer and a renewable energy developer’s project. Company X is building a picture of how a VPPA contract will impact its operations, in order to explain this to senior management. In Figure 3, the bilateral contract between the buyer and a renewable energy project was added to the business-as-usual chart.

⁴ For more information, see: <https://markets.businessinsider.com/news/stocks/fifth-third-signs-power-purchase-agreement-to-achieve-100-percent-renewable-power-1018272311>.

⁵ To read more about the market structure of the US electricity system, see: <https://www.epa.gov/greenpower/us-electricity-grid-markets>.

FIGURE 3

THE BUYER GUARANTEES A FIXED PRICE FOR POWER TO THE PROJECT, AND RECEIVES RECS



From Figure 3, Company X, the corporate buyer, knows the top green arrow depicts the fixed price (\$/MWh)⁶ that it will pay for the electricity produced by the developer's project. And the grey arrow depicts the RECs that Company X will receive in exchange for the clean electricity the project produces.

Company X knows that RECs are tradable at the buyer's discretion and that retiring RECs allows them to be counted toward sustainability goals while selling them concedes that right. Their newly acquired bundled RECs received through the VPPA can be sold into the REC market or retired. Bundled RECs are tied to the purchase of electricity while unbundled RECs are traded separately from electricity generation.⁷

⁶ To read more about megawatts (MW), megawatt-hours (MWh), and the difference between them, see: <https://www.energy.gov/eere/articles/whats-difference-between-installed-capacity-and-electricity-generation>.

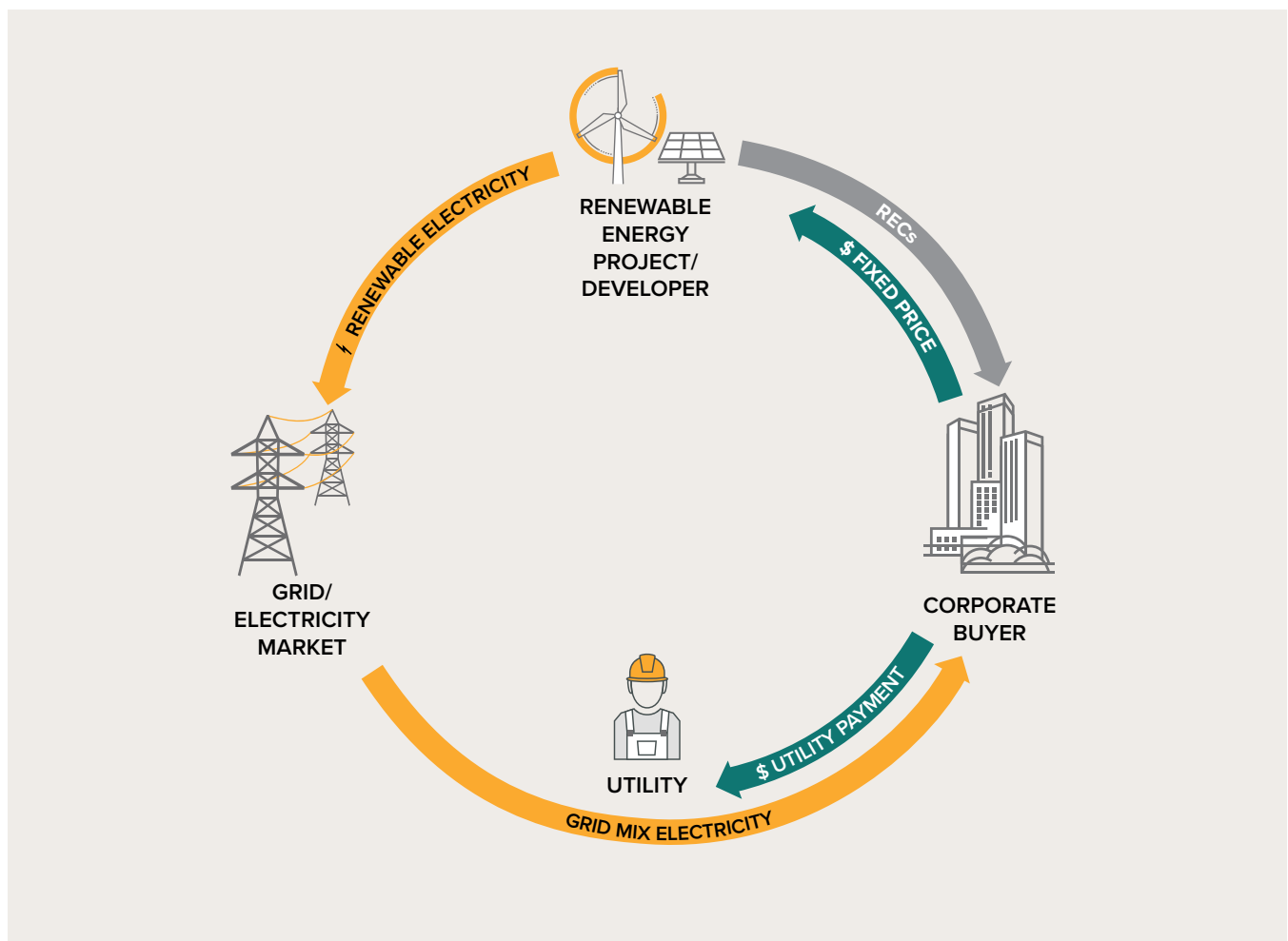
⁷ To read more on RECs, please see: <https://www.energysage.com/alternative-energy-solutions/renewable-energy-credits-recs/benefits-renewable-energy-certificates/>



Company X now engages a consultant and receives offers from project developers. Company X is considering a VPPA with an unbuilt wind project, located in northern Texas. Under the VPPA, Company X would guarantee a fixed price (\$/MWh) for that wind generation and would receive the associated RECs in return (Figure 3).

When the wind farm is operating, the electricity will be sold into the Texas wholesale market (see the top yellow arrow in Figure 4). Company X understands the electrons are not being transmitted to its location in New York, and that the wind farm's output joins the bulk of electrons flowing into the Electric Reliability Council of Texas (ERCOT) market⁸—all electrons are fungible.

FIGURE 4
THE PROJECT SELLS RENEWABLE ELECTRICITY INTO THE SAME MARKET WHERE IT IS LOCATED



⁸ ERCOT is the Texas deregulated market. Read more here: <http://www.ercot.com/mktinfo>.



Company X is told that the point-of-sale for the wind-powered electricity occurs at a “node.” Nodes are the fundamental units of the grid and are pricing points for electricity. They are priced in deregulated markets, and their price (\$/MWh) varies based on the supply and demand in the local region. Company X’s consultant highlights that pricing can vary significantly between nodes in the same deregulated market, state, and even local area.

Under a VPPA contract, the variable “market price” is passed to the buyer. In practice, this means there is a monthly or quarterly financial settlement between buyer and seller, and an invoice or credit note being sent from project owner to buyer. The amount depends on the overall delta between the VPPA fixed price and the actual market price received by the project.

The green arrow labeled “Market Price” in Figure 5 depicts the floating price being transferred over to a buyer, thus completing the fixed-for-floating swap, or “contract for differences,” as VPPAs are sometimes referred to.

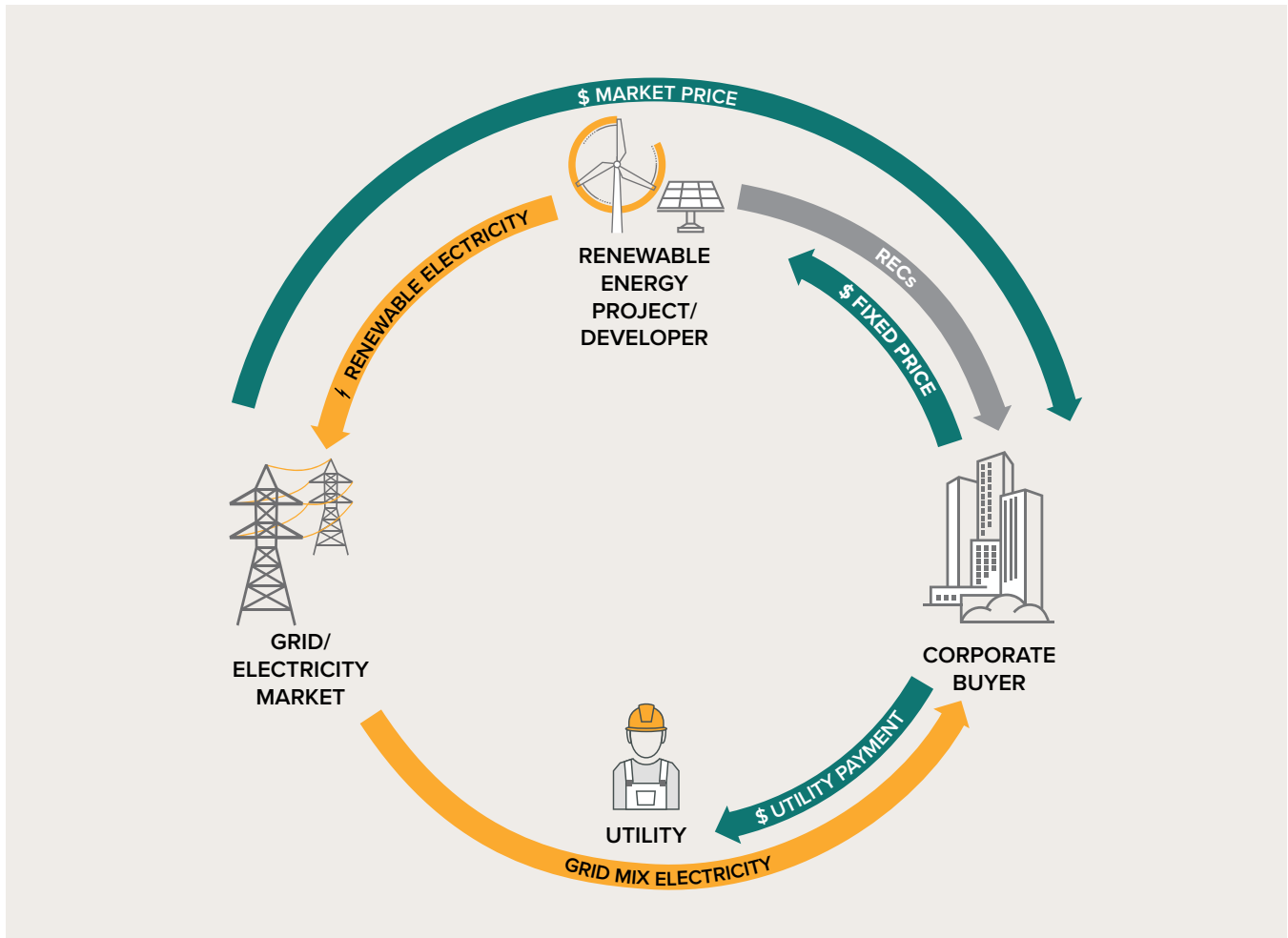
Company X is uncertain about contracting with a project if the nodal price can vary significantly. Company X’s consultant suggests that Company X ask the developer to settle at a “hub.” A hub, explains the consultant, is a virtual aggregation of nodes within a deregulated market. Because the hub is a collection of nodes and is more liquid, it influences the level of risk the buyer carries. Company X realizes that where the VPPA is “settled,” whether at a node or a hub, is a point of negotiation and changes the allocation of risk between buyer and seller.⁹

⁹ For a more detailed review of risks and risk allocation in a VPPA, refer to the BRC’s “Risk Allocation” primer on the online member portal. Contact BRC staff for more information.



FIGURE 5

THE COMPLETE PICTURE: THE BUYER RECEIVES THE FLOATING MARKET PRICE, AND THE RECS, FROM THE SALE OF RENEWABLE ELECTRICITY BY THE PROJECT, AND CONTINUES THE ONGOING UTILITY RELATIONSHIP



Company X now understands the principles behind a VPPA transaction. Company X's consultant advises that VPPAs are complex transactions, which can expose buyers to a variety of business and transactional risks not previously encountered. To read more about these risks and ways to mitigate them, refer to the BRC report *A Corporate Purchaser's Guide to Risk Mitigation*, [here](https://marketplace.cfapps.io/pages/risk_mitigation_guide).¹⁰

¹⁰ https://marketplace.cfapps.io/pages/risk_mitigation_guide