



Renewable Energy PPA Guidebook for Corporate & Industrial Purchasers

November 2016

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1600 K St. NW, Suite 650
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202.393.0001

Questions or Comments: info@acore.org

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EXECUTIVE SUMMARY

The growing consumption of renewable energy by corporate end users is fundamentally remaking the model for electric power sales in the United States. Commercial and industrial (“C&I”) customers are increasingly purchasing renewable energy directly via power purchase agreements (“PPAs”). In 2015, over 3.2 GW of power were contracted through PPAs by C&I purchasers. Continued growth is all but certain in the remainder of 2016 and beyond.

In order to expand the recent trend of companies procuring renewables directly, this report is intended to serve as a guide to the often complex PPA contracting process and is designed for companies unfamiliar with the key elements of successful PPAs. The report is organized into two sections:

- ▶ **Part 1 – Outline of Key Terms:** provides a high-level overview of terms and topics that parties should consider when structuring renewable energy PPAs between utility-scale wind and solar project owners and C&I purchasers.
- ▶ **Part 2 – PPA Guidebook:** contains a more detailed explanation and discussion of each topic in the Outline of Key Terms and offers both buyer and seller perspectives.

A group of prominent renewable energy developers, investors, professional service firms, utilities, and other companies contributed to this report. It should be noted that companies are procuring renewable energy via a number of transaction types other than PPAs, and this report focuses solely on contracting utility-scale PPAs. The report does not attempt to cover every contracting topic in C&I PPA transactions, but it does address many topics that have been highlighted as key areas of importance.

The C&I PPA market will continue to evolve as the goals of buyers and sellers change, and as renewable energy technology changes and costs are reduced. The Outline of Key Terms and the accompanying PPA Guidebook should be viewed as a snapshot of the current discussion.

PART 1: C&I RENEWABLE ENERGY PPA OUTLINE OF KEY TERMS

The following table in Part 1 of this report provides a high level outline of key terms and topics that parties should consider when structuring renewable energy power purchase agreements (“PPAs”) between utility-scale wind and solar project (“Project”) owners and corporate and industrial (“C&I”) energy purchasers. This Outline is supplemented by an explanatory guidebook in Part 2 that contains a more detailed explanation and discussion of each topic in the table and offers both Seller and Buyer perspectives. The Outline of Key Terms in Part 1 and the Guidebook in Part 2 cover both PPAs for physical delivery of energy and “virtual” PPAs that are financial transactions. In many areas of the U.S., only virtual C&I PPAs are possible because of energy regulatory constraints unless the Project is located on-site with the Buyer. A glossary of key terms is included at the end of the Guidebook.

The C&I PPA market will continue to evolve as the goals of C&I PPA Buyers and Sellers change and as renewable energy technology changes and costs are reduced. This Outline of Key Terms and the accompanying Guidebook should be viewed as a snapshot of the current discussion.

No.	Topic	Issue	Comments
1	Transaction Structure	(a) Physical PPA or (b) Synthetic or “Virtual” PPA	<p>Depending on applicable energy regulations and the locations of the Project and the Buyer’s load, the PPA transaction can either be structured for the delivery of physical energy or as a financial settlement of the renewable energy power prices and allocation of renewable energy credits (“RECs”) among the Buyer and Seller. PPAs structured as financial settlements are commonly referred to as Synthetic or Virtual PPAs and come in a number of forms. These include contracts for differences, hedging agreements (such as fixed for floating swaps), and “collared” transactions, in which the Buyer guarantees a floor price for the renewable energy generated and the Seller provides a ceiling on the price, so the effective price to the Buyer and the revenue to the Seller are assured of being within a defined range.</p> <p>Physical PPAs for the direct acquisition of energy by C&I Buyers from utility-scale, off-site generation Projects are only available in limited markets that allow direct energy sales from Project owners to customers.</p>

No.	Topic	Issue	Comments
2	Term	Typically 12-25 years (although both Physical and Virtual PPAs may be shorter)	Sellers and their investors will analyze the term of the PPA to evaluate the certainty and sufficiency of the Project revenue stream. Longer-term PPAs generally facilitate easier access to longer-term debt and tax equity financing for the underlying Projects, which can lower PPA prices for the Buyer.
3	Quantity (MW)	(a) Percentage of total Project (b) Isolated circuits/ turbines allocated to Buyer	For a Buyer that is not purchasing 100% of the energy output from a particular Project, there are generally two options to dedicate Project energy to the Buyer. A certain percentage of the total Project output can be allocated to the Buyer, or output from a dedicated portion of the solar modules or wind turbines may be dedicated to the Buyer.
4	Product Pricing	Specify per MWh price and pricing structure, including: (a) Components of fixed and floating prices for the PPA (b) Pricing in the event of a market failure (c) Inflation factor or escalation clause	The PPA pricing structure should be specified, including whether there will be a fixed energy payment or other payment structure, and whether RECs are separately priced (see Guidebook). Energy (or REC) pricing can be fixed at a set price for the term, or the PPA can include a pre-determined price escalation over the course of the PPA term.
5	Pricing Index and Basis Risk	(a) Day-Ahead (b) Real-Time (c) Node identified (d) Allocation of “basis” risk of price differential between Project busbar (see glossary for definition) and Delivery Point	A Virtual PPA that is a fixed-for-floating swap will need to specify the pricing index used for the floating payments and also the location for where the price will be established. Basis risk, and mechanisms for risk sharing, should be specifically addressed.
6	Seller Conditions Precedent (“CPs”) and Termination Rights	(a) Delivery term CPs including: (1) financing, (2) meeting critical construction milestones,	Conditions precedent and termination rights prior to the commencement of the PPA delivery term deserve significant focus from both Buyers and Sellers.

No.	Topic	Issue	Comments
		(3) obtaining required governmental approvals, and (4) obtaining critical Project contracts (b) Requirements for COD (see topic 7 below)	Consequences for failure to achieve CPs or COD target dates should be addressed and range from delay damages, to no-fault termination rights, to termination rights with termination payments (see topic 7 below).
7	Commercial Operation Date ("COD")	(a) Capacity % completed and other parameters for satisfaction of COD requirement (b) Deadlines for reaching COD (both expected COD date and Guaranteed COD date) (c) Delay damages	<p>The Buyer and Seller may specify a date by which the Project COD is expected to occur and a date by which COD must occur. The PPA will typically include the criteria for COD, including the percentage of the Project that must be completed to declare COD.</p> <p>The PPA may also include a termination date for failure to meet COD by the required date and an earlier expected COD date when the Seller will begin paying liquidated damages to the Buyer for delays in reaching COD on a timely basis.</p>
8	Delivery Point	(a) Busbar (b) Node (c) Hub (see Glossary for definitions)	Each of the three options listed refers to a different point on the electric grid with the Busbar and Node typically being at or near the Project and the Hub referring to a centralized trading location. The PPA should specify the delivery point where the Seller is required to deliver the Project's energy into the electric grid. The delivery point options will be specific to the Project and the Regional Transmission Organization ("RTO").
9	RECs	(a) Green-E, state, RTO or other recognized REC certification program (b) Revenue sharing if RECs are not retired (c) Tracking account	The PPA should specify the REC certification program to be utilized, whether the Seller may supply RECs generated from assets other than the Project, whether the Seller manages and pays costs, and the amount of any cap on the Seller's costs for REC certification and management.

No.	Topic	Issue	Comments
10	Other Environmental Attributes	(a) Revenue sharing (b) Allocation of future Environmental Attributes (other than RECs) (c) Allocation of incremental costs to obtain future attributes	<p>The PPA may cover allocation of carbon credits and other future green attributes, certificates, or value associated with the Project or the energy generated by the Project (“Environmental Attributes”). PPAs frequently clarify that tax benefits such as the Production Tax Credit (“PTC”) and the Investment Tax Credit (“ITC”) are not to be considered Environmental Attributes and are to be allocated to the Seller, and that the Project is not required to incur additional costs to obtain Environmental Attributes that become available in the future.</p>
11	Capacity Market Proceeds and Ancillary Services (if available)	(a) Allocation of capacity sales proceeds (b) Allocation of costs and responsibility for capacity market obligations (c) Allocation of proceeds from sales of other attributes, including ancillary services existing now or in the future	<p>Some RTOs and utilities pay wind and solar Projects for capacity in addition to an independent payment for energy. However, participation in RTO capacity markets can add risk to the Project based on performance obligations imposed on capacity providers, and can add significant complexity to the PPA transaction.</p> <p>While some RTOs and utilities compensate wind and solar Projects for capacity, C&I customers often just purchase energy (MWh) and RECs, so that the revenue stream from capacity sales may or may not be reflected in the C&I PPA.</p> <p>Sellers and Buyers should consider whether credit from the RTO is available (or will become available) for ancillary services or other attributes of the Project. Allocation of proceeds from the sale of these attributes should be addressed in the PPA.</p>
12	Availability or Minimum Production	(a) Level and type of performance guarantee for energy production from Project (b) Damages (including caps) or other	<p>PPAs frequently include either an availability guarantee or minimum production guarantee for a Project’s performance.</p> <p>If such a guarantee is included, parameters such as the availability percentage or</p>

No.	Topic	Issue	Comments
		<p>provisions for failure to reach guaranteed levels</p> <p>(c) Derivative accounting treatment</p>	<p>production amount, the guarantee's measurement period, and how outages are factored into the guarantee will need to be negotiated.</p> <p>The risk related to providing a guarantee is often factored into the PPA pricing by the Seller.</p> <p>Depending on the structure, minimum production guarantees in Virtual PPAs may trigger a requirement for derivative accounting treatment.</p>
13	Curtailment Rights	<p>(a) System-wide Curtailment</p> <p>(b) Economic curtailment (none or limited)</p>	<p>Parties should consider when and if the Buyer can request a curtailment of energy deliveries from the Project and the impact on the PPA of system curtailments ordered by the utility or RTO.</p> <p>Any requirement that a Project can be curtailed, other than for system-wide reasons, has negative implications for financing and PPA pricing if Seller is not reimbursed for energy and tax benefits lost due to the curtailment.</p>
14	Security	<p>(a) Buyer</p> <p>(b) Seller</p> <p>(c) Timing and amounts</p>	<p>The timing and amount of Seller and Buyer security can vary widely depending on the transaction and counterparties.</p> <p>Security posting amounts also may vary over the term of the PPA.</p> <p>Possible forms of credit support include letters of credit, cash, and parent guarantees.</p>
15	Dodd-Frank Reporting	Virtual PPAs trigger Dodd-Frank reporting requirements	Both parties must satisfy several Dodd-Frank requirements and, in certain cases, one party may need to be designated as the party responsible for undertaking reporting responsibilities under the Dodd-Frank legislation and regulations.

No.	Topic	Issue	Comments
			If the Buyer has the operational and technical ability and infrastructure to perform the reporting, it may be designated as the reporting party, but the Seller is usually better positioned to do so.
16	Limits on Liability	(a) Pre-COD (b) Post-COD	The PPA should specify any pre-COD and post-COD limitations on counterparty liability.
17	Termination Rights, Events of Default, and Force Majeure	(a) Project and transaction-specific events of default and termination rights (b) Applicable cure periods for events of default (c) Obligations and termination rights if a force majeure event occurs	Events of default and termination rights are typically based on physical performance of the Project or the adherence of the parties to the terms of the PPA (or failure to meet payment or settlement obligations in the case of financially settled transactions) rather than changed circumstances. Each party is typically given a limited opportunity to cure some events of default, which may be extended if the cure is being diligently pursued. Extended force majeure limiting performance typically triggers a termination right for the party not claiming force majeure.
18	Other Standard Terms	--	PPAs typically include other standard contractual terms and obligations, including company representations and warranties, obligations regarding contract assignment, reporting requirements, changes in law, indemnification, confidentiality, and dispute resolution.

PART 2: CORPORATE & INDUSTRIAL RENEWABLE ENERGY PPA GUIDEBOOK TO OUTLINE OF KEY TERMS

The following PPA Guidebook in Part 2 of this report supplements the Corporate & Industrial Renewable Energy PPA Outline of Key Terms in Part 1 by providing a more detailed discussion and explanation of the topics in the Outline of Key Terms and perspectives of both C&I PPA Buyers and Sellers. The PPA Guidebook is intended to provide C&I PPA Buyers and Sellers of renewable energy with an overview of certain key considerations for structuring their PPAs. The Outline of Key Terms in Part 1 and the PPA Guidebook in Part 2 cover both PPAs for physical delivery of energy and “Virtual” PPAs that are financial-only transactions. In many areas of the United States, only Virtual PPAs are possible due to energy regulatory constraints unless the Project is located on-site with the Buyer. A glossary of key terms is included at the end of this PPA Guidebook.

The C&I PPA market will continue to evolve as the goals of C&I PPA Buyers and Sellers change and as renewable energy technology changes and costs are reduced. This guidebook and the accompanying outline of key terms should be viewed as a snapshot of the current discussion.

1. Transaction Structure

The option to pursue a standard physical power purchase agreement (“Physical PPA”) or a structured synthetic or “virtual” power purchase agreement (“Virtual PPA”) is based both on Buyer and Seller preference and on whether local energy sales regulations permit Physical PPAs between Project owners and C&I customers that are not for behind-the-meter Projects.

Physical PPAs

Physical PPAs are the traditional form of a renewable energy purchasing transaction, where the Project owner and Buyer enter into a long-term contract for the energy generated from the Project. In a Physical PPA, the Buyer takes physical delivery of the energy.

While C&I purchases of energy from on-site, “behind-the-meter” renewable energy Projects are permitted in most states, only a limited number of states permit direct retail sales by non-utility Project owners utilizing the electric grid. Thus, Physical PPAs from utility-scale, off-site generation Projects will only be available in states that allow for competitive retail energy sales to C&I customers as opposed to either (a) regulated markets where only utilities can supply physical electricity to end-users or (b) competitive wholesale markets that nonetheless do not allow for competitive retail sales to C&I customers by Project owners. Where direct sales from off-site generation is permitted, there can be location-specific transaction structuring and permitting complexities that need to be addressed to meet state energy regulations. Physical PPAs may also be structured in other markets that do not allow such direct energy sales through “sleeved” transactions but this structure requires the use of an intermediary (usually a utility or other market participant with the ability to purchase electricity at wholesale).

Physical PPAs are typically as-generated contracts (i.e., the customer takes delivery and pays for each MWh of energy generated by the Project without any guarantee of generation amounts in any particular

hour). The other less-common option is for fixed quantities of energy that are independent of the Project's physical performance. Fixed-quantity PPAs require the Seller to sell any energy produced greater than the fixed quantity to a third party (e.g., the local utility) and to procure energy from a third party for deficient quantities. Since this approach is riskier for the Seller, the price for fixed quantity PPAs is typically higher than the price for as-generated PPAs.

Virtual PPAs

By contrast, a Virtual PPA can provide an alternative to the Physical PPA in states where direct retail sales are not permitted, or where behind-the-meter generation is not an optimal solution.

A Virtual PPA is a financial contract only. Virtual PPAs can take several forms. A common form is a "contract for differences" under which (1) the Buyer agrees to purchase renewable energy and RECs from a Project for a fixed price, (2) the Seller sells the "brown" power (without the associated RECs) into the market, (3) the Buyer keeps the RECs and purchases the power it actually uses from its local utility, and (4) the Buyer and Seller settle the difference between the contract (fixed) price and the applicable market (floating) price on a periodic basis. The PPA should specify whether the transaction is based on an as-generated schedule or a set monthly amount. Virtual PPAs can also take the form of hedging agreements or be structured as "collared" transactions, in which the Buyer guarantees a floor price for the renewable energy, and the Seller provides a ceiling on the energy price, so the price to the Buyer and the revenue to the Seller are assured of being within a defined range.

2. Term

The length of the contract term is an important consideration for the Buyer, Seller, and the Seller's financing parties. Physical PPAs and Virtual PPAs typically have terms of 12-25 years, although some PPAs are shorter, depending on the needs of the parties. Although infrequent, PPA terms do exceed 25 years in some cases, and shorter-term PPAs are sometimes implemented when doing so meets the objectives of both the Buyer and the Seller.

The Seller's financing parties will analyze the PPA's revenue stream in order to evaluate the level of certainty of debt repayment and return on investment for the Project's equity. Generally, the longer the term of the PPA, the easier access the Project will have to longer-term debt and tax equity financing since price risk is reduced for a longer duration.

The term of the PPA is also greatly influenced by the availability of tax credits. For wind Projects that utilize the PTC, Project owners are entitled to PTCs during the first 10 years of the Project's operation following the "placed in service" date. Therefore, many tax equity investors investing in wind Projects require that any offtake agreements last for a period of time longer than 10 years (the 10-year PTC eligibility period and a 1-2 year "tail" for example) to reduce revenue risk of the tax equity investor not earning its target return during the PTC period. For Projects taking advantage of the ITC, tax investors may require a shorter PPA term, but financing parties are still interested in the certainty of a long-term revenue stream for the Project. Also, many Buyers prefer longer-term PPAs (20+ years) because the Seller is typically able to offer lower energy prices to the Buyer based on longer PPA term lengths.

3. Quantity (MW)

Determining how much of a utility-scale renewable energy Project the Seller will commit to the Buyer's needs is Project- and transaction-specific. This determination requires weighing the Buyer's goals with the expected generation and natural intermittency of the energy from the Project. For example, if the Buyer has a very specific goal related to how many RECs it needs to receive from a Project, the Buyer may target the expected annual production (generally "p50" for a wind Project) at the goal and generally seek to purchase output from a portion of the Project expected to produce that quantity. The Project's financing parties will often require the Project's energy to be fully contracted to be financeable, so it is not uncommon to have multiple PPAs for other offtake transactions for the same Project.

For a Buyer that is only purchasing a portion of the output of a Project, there are two approaches to structuring the PPA. First, it is possible to purchase 100% of the output from a dedicated portion of the Project by using an electrical sub-meter that is connected to a specific collection system circuit allocated to the Buyer. This would provide the Buyer with specific wind turbines or solar modules in the Project that are dedicated to the Buyer's PPA. Alternatively, the Buyer can take a percentage of the total Project output.

Dedicating specific wind turbines or solar modules to the Buyer is common with utility Buyers who are buying physical energy, and can also be used in C&I PPAs where the Buyer is taking less than 100% of the energy from the Project. One benefit of dedicating a portion of the Project to the Buyer is the certainty of allocating energy production to the Buyer since the output of the specific turbines or modules can be separately metered. Requiring dedicated turbines or modules has several disadvantages, including that (i) it potentially increases the capital cost and engineering costs for the Project (the developer may have to size a circuit to match the number of turbines required by the Buyer rather than sizing the circuits in the way that is most cost-effective for the Project as a whole, and an additional meter has to be purchased), and (ii) it reduces capacity flexibility for the Buyer (capacity purchased has to be equal to the output from a specific number of turbines or modules).

Assigning a percentage of the Project output requires defining the portion (e.g., a percentage or specific pro rata fraction) of all the energy produced by the Project that will be dedicated to the Buyer. This structure potentially reduces cost in Project design and provides the Buyer with more potential flexibility to have the PPA sized specifically to its needs.

If there are multiple PPAs for the same Project, the Seller must navigate documentation issues, scheduling coordination issues, and issues involving allocations of electricity during periods of diminished performance. Careful documentation is needed to control risk if fractional electricity output is allocated among multiple PPAs. Failure to properly align risk allocation provisions of multiple PPAs may create, at best, administrative burdens in coordinating disparate provisions and, at worst, misaligned risk allocation altogether, leaving the Project in a position of absorbing risk in certain cases that should be allocated to the Buyers. For example, fractional allocation under a Physical PPA requires particular attention to scheduling coordination, especially if multiple delivery points exist under different PPAs. If those PPAs include inconsistent provisions regarding required delivery forecasts, or if each Buyer has a different scheduling entity, the administrative burden on the Project is significant.

Allocating fractional capacity can also present challenges and complexity with respect to managing outage events, especially curtailments or force majeure. If a Project is physically unable to deliver its full output, the parties will need to agree upon whether reduced output is allocated pro rata to each Buyer or whether certain Buyers have priority with respect to some or all of the reduced output. The Seller must also manage the relative rights of Buyers to terminate their PPAs if there is a prolonged force majeure event, including the extent and duration of the force majeure event that gives rise to such termination rights.

If there are multiple PPAs for different percentages of a Project's capacity, the parties will generally need to consider the implications to their transaction or the financing for the Project if one of the other PPAs terminates or expires and the energy from that portion of the Project has to be sold into the market on a merchant basis.

4. Product Pricing

Investors in renewable Projects generally prefer PPAs that contain simple and specific prices for energy and RECs. Depending on the location of the Project and the relative value of the RECs, there may be a single price for energy and RECs, or sometimes the pricing is separated. Unlike fossil fuel Projects (which can have variable fuel costs), renewable energy Project costs are generally fixed: debt (or tax equity) service and then operation and maintenance ("O&M") costs, which can typically be fixed by contract on a long-term basis. This leaves production uncertainty as one of the main variables for Project sponsors and their financing parties to analyze.

Introducing variability into the energy price distracts from this simplicity. While some Sellers have added inflation indices to the PPA price to provide lower initial pricing to Buyers, the magnitude to operating costs and debt service is lower for renewable energy Projects. Nevertheless, a very common pricing structure for the fixed-price component of Virtual PPAs is a set price with a fixed annual escalation percentage.

Occasionally with utility Buyers, system or network charges to the Project during operation may be passed to the Buyer through a price adjustment. C&I Buyers are less receptive to this idea, as it introduces a system risk from an industry process in which they are not generally participants (in contrast to utilities that participate in regional planning processes). However, if such a provision is used, a preferred practice is to specify how such price adjustment will be applied (e.g., ratably using a p50 estimate for the remaining years until the total cost is recovered (earning interest), and then the price returns to the original level).

For REC prices, the same principles apply: simple and specific. In most cases, the RECs are "bundled" with the energy payment. If REC and energy prices are separate, most REC prices are fixed for the entire term and rarely escalate. See topic 9 below for more on RECs.

5. Pricing Index and Basis Risk

The essence of many Virtual PPAs is an exchange of payments or a "swap." In a fixed for-floating payment swap, a series of fixed-price payments from the Buyer is exchanged for a series of variable-

priced or “floating” payments from the Seller. The variable price used to calculate the floating payment is also called the “index.”

In centralized power markets, a regional transmission operator (“RTO”) determines the price for power in the spot market. This pricing is often the basis for the variable price used to calculate the floating payment. The RTO determines the spot pricing by comparing all of the price offers from its network of power plants in a specific area against the changing system demand. Higher demand periods require higher prices, and these prices are set through an auction process. These price signals guide how an RTO dispatches the power plants with the goal of minimizing overall system costs while maintaining system reliability, and at the lowest price required to dispatch the last power plant needed, or the “marginal” price.

Because of transmission constraints, an RTO may dispatch a higher-priced generator closer to the load. Thus, there is a locational component as well. In summary, an RTO determines Locational Marginal Prices (“LMPs”) in units of \$/MWh across all the generator interconnection nodes in its system.

The simplest index for the Seller to calculate the LMP is its own Project Node or Busbar LMP. The Project’s revenue in a Virtual PPA is the product of its generation (“MWh”) and the LMP (\$/MWh). Through a typical Virtual PPA, the Seller will exchange the stream of revenue it will receive from the RTO with a fixed-price stream of revenue from the Buyer where the only unknown is the amount of generation from the Project. This is how the Virtual PPA “firms” the revenue of the Project, while also protecting the Buyer from higher power prices. As LMPs rise above the fixed price, the revenue stream from the Seller to the Buyer increases.

In a Virtual PPA, since the Project is not directly supplying electricity to the Buyer, there is an unavoidable pricing risk. The Buyer is paying for its physical electricity based upon the cost of power at its facilities, not the Project’s LMP. So, for example, although the floating payment stream to the Buyer from a Virtual PPA may be increasing, the Buyer’s actual power costs may have increased more.

One way to mitigate this risk for the Buyer is to switch the Virtual PPA index to an LMP that is closer to the Buyer’s facilities. Often this is a “Hub” price, where a Hub is an average of LMPs in a zone or region. While this approach may be better for the Buyer because the Hub pricing is generally more stable and less subject to variances from unforeseeable events like outages, “basis risk” for the Project is created since the Busbar or Nodal price may be higher or lower than the point of delivery or Hub price, in which event the Seller may be required to take the basis risk, or the risk needs to be allocated between the Parties. Because of this increased risk for the Seller, the fixed price for a Hub-settled Virtual PPA will generally be higher than a Busbar-based Virtual PPA.

The Seller and the Buyer should identify any basis risk potential in the transaction and specifically address how it will be dealt with in the PPA, including any agreements regarding allocating or capping costs associated with the pricing differential.

One additional detail: RTOs usually conduct Day-Ahead (“DA”) and Real-Time (“RT”) auctions for energy sales. As the names suggest, the DA auction is conducted the day before the actual power production and is based upon forecasts from the power generators (supply) and utilities (demand). While the RT auction is not literally real time, it is conducted closer to the actual run time of the generators. In Virtual

PPAs, the Buyer may prefer DA indices, which would allow subsequent financial trades with third parties to further manage its Virtual PPA power position. For the Seller, this creates risk as the DA LMP is not the same as the RT LMP it earns from the RTO. Like the Hub index, a DA index will result in a higher fixed-price Virtual PPA than an RT index.

Due to these and other complications of the Pricing Index, this is one of the first topics a Seller and Buyer should discuss.

6. Seller's Conditions Precedent (CPs) and Termination Rights

The Parties will want to have clear conditions precedent ("CPs") to the commencement of the PPA's energy delivery term and set out any termination rights the Seller or Buyer will have if certain events do not occur prior to the start of the energy delivery term.

Common Seller CPs include meeting critical construction milestones, achievement of COD (see Topic 7 below), posting required credit support, and obtaining all required government approvals for constructing and operating the Project.

Typical Project-specific termination rights prior to the start of the PPA's delivery term for events or circumstances that are outside of the Seller's control include failure to obtain interconnection arrangements by a date certain at a reasonable cost or failure to obtain critical permits by a certain date. In most PPAs, because these types of events are usually outside the control of the Seller, they are often "no fault" termination events, allowing the Seller and Buyer to terminate the PPA without cost or obligation to either party.

One additional CP that is frequently requested by the Seller is a financing condition. This means that if the Project is unable to obtain financing (or commitments for financing) or other written evidence of its ability to complete the Project by a negotiated date certain, then either party will have the right to terminate the PPA. For most Sellers, financing a wind or solar Project is typically a lengthy and complex process because most Projects are financed on a limited or non-recourse, project finance basis. Construction of the Project is reliant on the Seller obtaining financing from a limited pool of tax equity investors, which are investors with enough tax appetite to effectively utilize the tax credits associated with the Project. Given the uncertainty associated with obtaining financing at the time when PPAs are typically negotiated during the pre-construction phase, Sellers will often require this type of contingency or off-ramp.

Regarding this right to terminate, the negotiation usually focuses on timing and whether there will be a termination fee. With any such deadline, the ability for the Seller to extend the termination date may be granted in the Buyer's commercially reasonable discretion, as long as evidence of progress (e.g., signed term sheets) is provided. Termination fees are case-by-case and may change over time. Buyers have internal goals, and the termination of a PPA for whatever reason may disrupt the Buyer's sustainability progress. As an alternative to a fee, forfeiting all or a portion of the security provided by the Seller (see topic 14 below) is one possibility. Another way to estimate the fee is to cover the costs of RECs while the Buyer searches for a new PPA. As with all liquidated damages, more clarity on the termination fee combined with an overall limit to liability is best (see topic 16 below). Also, in some

situations, a fee may not be necessary, especially if the date certain is likely to be achieved within a reasonable time following execution of the PPA.

7. Commercial Operation Date (“COD”)

Most PPAs require that the Seller achieve Project commercial operations by a date certain (the “Guaranteed COD Date”). The expected COD date is often also specified. COD conditions typically include a significant portion of the Project having been constructed, permits having been obtained, and certification by the Seller or an independent engineer that COD has been reached. Consequences of delays, or failure to meet COD by the expected COD date or Guaranteed COD Date, may include delay damages or a termination right if the delay extends past the Guaranteed COD Date. Delay liquidated damages are often structured as a set amount per MW per day for the portion of the Project that has not yet reached COD.

Sellers and Buyers sometimes agree that if a Project has reached certain milestones and a substantial portion of the Project has reached COD, a Project “buy-down” can be elected where the Buyer will agree to reduce the PPA size to the portion of the Project that has been completed in exchange for some deficit payment made by the Seller to compensate the Buyer for the decreased transaction size.

Note that delay liquidated damages and certain other obligations under the PPA may be postponed for 12 to 24 months during the duration of a force majeure event. If the force majeure event has not been resolved within the 12 to 24 month period, the party not claiming the force majeure event may terminate the PPA at no cost to either party.

8. Delivery Point

For Physical PPAs, the delivery point is typically the electrical interconnection point (usually the Busbar, as defined in the glossary below) between the Project and the utility’s or customer’s electric transmission system. Sometimes this is also called the “point of interconnection” or “POI.” In some transactions, the delivery point is a Node or trading Hub that is not located in close proximity to the Project. In this case, the Project will need to have transmission rights to deliver the energy to this point. The delivery point is the point at which title and risk of loss related to the Project’s energy passes from Seller to Buyer. The delivery point options will be Project- and RTO-specific.

Since no physical product is delivered in a Virtual PPA, the delivery point is not used as a concept in the PPA to establish a point of physical energy delivery to the Buyer. However, the delivery point concept can be used to describe the pricing index (e.g., the Busbar or Hub; see topic 5 above) and set out the Seller’s obligation to sell the Project’s energy into the market at an agreed delivery point.

A preferred practice in Virtual PPAs is to state explicitly that the contract is financial only and no physical delivery is expected.

9. RECs

RECs are a method of documenting and certifying the renewable energy benefits associated with one megawatt-hour (MWh) of energy generated by renewable energy Projects. A majority of the U.S. states have Renewable Portfolio Standard (“RPS”) laws requiring certain wholesale electricity providers to

source a portion of their electricity supply from renewable energy facilities. RECs or other “Environmental Attributes” are the tracking mechanism for these state standards. In states with mandatory RPS compliance obligations, RECs are typically defined by statute or other regulatory authority. There are alternative industry-recognized organizations that can certify RECs for Projects in states that do not have mandatory compliance obligations and for renewable energy produced from behind-the-meter systems.

When structuring a PPA, the parties must develop a plan to address how RECs and other Environmental Attributes generated from the Project will be allocated. The C&I Buyer may either buy the RECs or allow the Project to retain the RECs for re sale. The parties also need to decide which REC certification program will be utilized. There are a variety of REC arrangements that have been structured, and Buyers and Sellers frequently will consider their goals and the relative costs of different REC certification options for a Project in deciding how to structure the REC arrangement for a particular transaction.

For C&I Buyers planning to advertise the environmental benefits of their renewable energy purchases, there is Federal Trade Commission guidance that limits what can be said depending in part on who has ownership of the Project’s RECs.

10. Other Environmental Attributes

While RECs are the most common form of environmental benefit in renewable energy PPAs, different benefits may be created during the PPA term (e.g., carbon offsets or credits in addition to RECs). Buyer and Seller should explicitly state how future benefits will be allocated during the PPA term. Given the uncertainty of future Environmental Attributes being created, investors typically do not assign value to these future benefits. Upfront allocation of these attributes helps to avoid any contractual uncertainty in the future. Sellers are not typically required to incur additional unknown future costs for obtaining Environmental Attributes that are not available at the time the PPA is executed. Sellers are also not required to guarantee Project qualification for these Environmental Attributes.

Tax benefits are often expressly carved out of the attributes that the Buyer is entitled to receive. Those benefits are typically reserved for the Seller and the Seller’s investors.

Example Definition: “Environmental Attributes” means any and all credits (including carbon trading credits), benefits, emissions reductions, offsets, and allowances, howsoever entitled, attributable to the Project, the production of electrical energy from the Project and its displacement of conventional energy generation, including (a) any avoided emissions of pollutants to the air, soil or water such as sulfur oxides (SOx), nitrogen oxides (NOx), carbon monoxide (CO) and other pollutants; (b) any avoided emissions of carbon dioxide (CO₂), methane (CH₄), nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride and other greenhouse gases (GHGs) that have been determined by the United Nations Intergovernmental Panel on Climate Change, or otherwise by law, to contribute to the actual or potential threat of altering the Earth’s climate by trapping heat in the atmosphere; (c) the reporting rights related to these avoided emissions, such as green tag reporting rights and renewable energy credits; and (d) credits, rebates, subsidies, payments or other incentives that relate to self-generation of electricity, the use of technology incorporated into the Project, environmental benefits of using the Project, or other similar programs available from any third party or governmental authority.

Between Seller and Buyer, the Seller shall retain the ownership and benefit of the Tax Benefits associated with the Project and the energy generated by the Project.

11. Capacity Market Proceeds and Ancillary Services (if available)

In some RTOs, wind and solar Projects are eligible for revenue from a capacity market. These payments are sometimes viewed as reliability payments. Revenue is additional to payments for energy, and is paid to ensure that additional capacity is available should the system need arise.

The capacity market rules vary by RTO, and some RTOs require the generator to commit to the next day's generation in order to receive the capacity market revenue. Other RTOs impose penalties if the generator did not operate during the peak hours of the period. Due to the intermittency of wind and solar Projects, participating in these capacity markets can add risk to the Seller.

The capacity payment level is typically determined by seasonal auctions, can vary significantly, and is largely uncorrelated to the energy prices in the region.

Since this revenue stream is outside the energy price index used for the exchange of payments, Buyer and Seller should state explicitly if and how such revenue will be shared. If Buyer receives all or part of the net additional capacity revenue, then the Seller should be compensated for the additional risk borne to earn the revenue, including any penalties resulting from inaccuracies between the amount of capacity scheduled and the amount ultimately produced resulting from the intermittency of the Project's generation. Due to this complexity as well as the weak relationship between the Project's capacity revenue and the Buyer's energy cost, most C&I Buyers waive any claim to capacity revenue, and some Sellers prefer not to be required to participate in the capacity market under their PPAs.

Ancillary services and resource adequacy payments can be treated similarly to capacity payments. Sellers and Buyers should consider whether credit from the RTO is available for ancillary services or other attributes of the Project and specify allocation of credit and cost responsibility. Other ancillary services and attributes are generally not available for wind and solar Projects at this time. However, it may be useful to allocate for ancillary services and attributes available in the future considering the long-term nature of many C&I PPAs and the rapid technological advances in the renewables sector.

12. Availability or Minimum Production

While renewable energy Projects are intermittent, Sellers can provide some assurance that annual energy production will exceed an agreed threshold amount. The two most common forms for this assurance are either an availability guarantee or a production guarantee.

Availability Guarantee

In a PPA utilizing an availability guarantee, the Seller promises to pay the Buyer liquidated damages, or a default is triggered, if the Project is not available to produce energy at an agreed percentage over a set period of time. Availability guarantees are commonly used for wind Projects but not for solar Projects. Availability is an explicitly defined term in the PPA that, in general, means the wind turbines and the balance of the Project are available to produce energy when the wind blows. It is important to note that this does not include system reasons why production is curtailed, such as a transmission outage or

system emergency. Those periods of non-production as well as periods of force majeure and other outages beyond Seller's control are typically excluded from the availability calculation.

Wind turbine vendors often provide availability guarantees to the Project owners, so the Seller can calculate the level of the PPA guarantee (and liquidated damages amounts) to the Buyer based on the turbine vendor's guarantee. However, the guarantee to the Buyer will be lower than the guarantee from the turbine vendor since more of the Project is included in the PPA guarantee compared with the turbine vendor guarantee. For example, if a main transformer fails, the wind turbines will be available under the turbine vendor guarantee, but the Buyer might be owed damages since the Project cannot produce energy. While the balance of plant equipment (i.e., the portions of the Project other than the wind turbines) sales terms often include guarantees, they are rarely for a duration which matches the PPA term.

Production Guarantee

Some wind Projects and solar Projects offer the Buyer an explicit production guarantee that the Project will produce a minimum amount of energy over a specified period. For example, the Seller will pay the Buyer damages if the Project does not produce a specified quantity over a three-year period. System-wide curtailments which are not the fault of the Project are excluded, and an average across a multi-year period (e.g., two or three years) is the typical calculation method.

One issue that should be considered by the potential Buyer when requesting a production guaranty is the likely accounting treatment of the PPA. If there is a minimum production guarantee in a Virtual PPA, that guarantee could be construed to be a "notional amount" under FAS 133, and could result in the PPA counting as a derivative instrument for accounting purposes. Buyers should therefore consult with their accountants for guidance when requesting these types of guarantees from Sellers.

Damages for both types of guarantees can be either fixed or market-based. For market-based damages, the Seller might pay the Buyer the difference between the PPA fixed price and the market price for energy and RECs for the period of non-production. The concept is to cover what the Buyer would have spent to replace the deficient production, and actual replacement is not required. It is best to state explicitly how that market-based price will be calculated. One common example is to take an average of three nationally-recognized brokers.

For investors, liquidated damages, and especially market-based damages, may create an issue for financing, where a period of low production is then coupled with a large additional amount owed to the Buyer. In most cases the Seller and Buyer's interests are highly aligned, and the Seller will be motivated to produce as much energy as possible during the measurement period. In addition to the overall limit on liability (see topic 16 below), an explicit limit to this guarantee is sometimes included in the form of caps on liability for failure to meet the performance guarantee.

Note that Project owners normally carry insurance to cover some equipment failures. However, the complexity of the policies and deductibles makes it difficult to translate this mitigant to the Seller's guarantee to the Buyer.

13. Curtailment Rights

Curtailment refers to the intentional reduction or stopping of the Project's energy production in response to electric system requirements or the exercise of contractual rights.

Utilities use curtailment of energy production as a way to manage imbalances between the supply of electricity from both their contracted generation and their self-owned power plants, on one hand, and the demand for electricity from their customers, on the other hand. Traditional PPAs with utility purchasers have generally afforded utilities the right to curtail output so long as Sellers are made whole for lost revenue from production and any loss of associated tax benefits, and the Sellers are not penalized for the curtailment under any mechanical availability or production guarantees in their PPAs. PPA curtailment provisions are often closely scrutinized by the Project's financing parties to examine whether the provisions appropriately allocate cost and responsibility.

Buyers are not, however, always in control of curtailment decisions. Certain transmission events might lead to curtailments simply as a result of grid conditions. Line outages and force majeure-caused curtailments are obvious examples, but curtailment can also result from congestion when production of electricity from wind and solar Projects exceeds the available transmission capacity. Allocating financial and operational responsibility to manage curtailments often involves issues surrounding the requirement to forecast (and the quality of forecasting), the responsibility to acquire certain transmission rights, and the responsibility to schedule into the day ahead and real-time markets.

In a Physical C&I PPA, curtailments frequently follow the traditional utility risk allocation model (i.e., if a C&I Buyer finds that its load is insufficient to absorb the as-generated electricity from its contracted Seller, it has the right to curtail production so long as (1) it pays for lost revenue and associated tax benefits from the curtailed energy (e.g., PTCs for wind Projects) and (2) the Seller is not penalized under any mechanical availability or production guarantees in the PPA). And if curtailments occur, but are not due to any action or inaction by Buyer, allocating risk generally also follows the traditional utility model and Buyer is not obligated to compensate Seller for lost revenue.

In a Virtual PPA, by contrast, the C&I Buyer is generally not able to order a physical curtailment of the Project. However, Virtual PPAs may specify that no settlements will occur when prices are below a set floor. The price floor for wind PPAs is often set at the negative price where it is no longer economic to operate the Project after taking into account the value of PTCs. Solar Projects are typically not dispatched below the market price of \$0. Curtailments due to outside events would simply result in a zero settlement as to those periods, but, like in Physical PPAs, Sellers are not penalized for any mechanical availability or production guarantees for these periods of curtailment. There are sometimes make-whole payments from the Buyer because stopping settlements at the price floor is a benefit to the Buyer as it is not having to make settlement payments based on the low market price. As with Physical PPAs, economic curtailment provisions in Virtual PPAs are closely scrutinized by financing parties.

14. Security

Physical PPAs and Virtual PPAs generally require Sellers and Buyers to post security or meet negotiated creditworthiness standards. Since the Seller is likely to be a special purpose vehicle, the Seller typically posts security in favor of the Buyer. Buyers also post security in favor of the Seller when the PPA is not

executed by the ultimate parent company or when the Buyer's credit does not meet thresholds required by the Seller's financing parties. The security amounts sometimes adjust at different milestones during the term of the PPA, such as at COD, to reflect Buyer and Seller exposure levels. The Project's operating period security also is sometimes adjusted upwards or downwards at different times during the PPA term to reflect the Buyer's and Seller's financial exposure under the PPA.

Seller Security

In Physical PPAs and Virtual PPAs, the Seller has an obligation not only to generate and deliver energy, RECs, and environmental and other attributes, but also potentially to pay net settlement amounts. Buyers typically require credit support from Sellers because the Buyer is exposed both to this payment risk and to market price risk in the event the Seller does not perform and the Buyer has to replace the energy or enter into a new replacement transaction.

Typical Seller security is in the form of cash or a letter of credit. PPAs should spell out financial and other requirements for the banks holding the cash or issuing letters of credit. A form of letter of credit is often agreed upon in advance and attached to the PPA as an exhibit. If cash is posted as security, it may also be necessary to negotiate a form of escrow agreement allowing for posting and disbursement of cash.

Affiliate guarantees are sometimes permitted as a less expensive alternative to posting cash or a letter of credit. If they are allowed, a number of issues will be considered in negotiating the guarantee, including the creditworthiness requirements of an affiliate guarantor, the size of the guarantee obligation and related caps, and the contractual terms of the guarantee.

While liquid security of the type described above is most common, PPAs may also contain less frequently used forms of security, such as subordinated mortgages or security interests, debt to equity ratios, and limitations on the incurrence of indebtedness or liens. Any such alternative security needs to be carefully evaluated for its impact on the overall financing of the Project.

Buyer Security

Under traditional utility PPAs, the utility purchaser rarely provides security because the PPAs are generally approved by a state public utility commission, which allows the utility's costs to be recovered in the rates charged to customers. In the case of C&I Physical PPAs and Virtual PPAs, the parties cannot pass through the Buyer's costs under the PPA to third parties. Accordingly, Buyers typically provide security under Physical PPAs and Virtual PPAs. Buyer security requirements vary depending on creditworthiness of the Buyer entity entering into the PPA and the Seller's exposure under the PPA.

While companies may sometimes have stronger credit than utilities, C&I Buyers may often choose to execute PPAs through subsidiaries that are not as well-capitalized as their parent companies. In those circumstances, the Seller will typically require some form of credit support, in the form of cash, a letter of credit, or a parent company guarantee from a creditworthy entity.

Financial reporting requirements are sometimes included to enable the Seller to monitor the Buyer's credit if a guarantee is being posted or if security requirements change depending on the Buyer entity's (or its guarantor's) credit profile.

15. Dodd-Frank Reporting

Virtual PPAs, whether in the form of contracts for differences or commodity hedging agreements, generally constitute “swaps” under the U.S. Commodity Exchange Act (as amended by the Wall Street Transparency and Accountability Act of 2010) (the “Act”, also commonly called “Dodd-Frank”) and fall within the regulatory jurisdiction of the Commodity Futures Trading Commission (“CFTC”).

Currently, the CFTC has not mandated that Virtual PPAs of the type addressed in this PPA Guidebook must be exchange traded and centrally cleared under the Act, so they generally would be entered into “over the counter” and cleared bilaterally between counterparties. Nevertheless, several regulatory requirements apply to Virtual PPAs.

First, to be able to enter into an over-the-counter swap, each party must have at least \$10 million in total assets or otherwise qualify as an “eligible contract participant” at the time of execution of the swap. In addition, prior to the execution of the swap, both parties are required to obtain a “legal entity identifier,” which is a unique identifier issued by an entity designated by the CFTC.

Both parties to a swap will also be required to comply with certain recordkeeping obligations. Parties that are not registered as either “swap dealers” or “major swap participants” under the Act nevertheless must maintain comprehensive records of each swap in paper or electronic form. Records must be maintained throughout the life of the swap and for a period of at least five years from the final termination of the swap, and generally must be retrievable within five business days. The records are open to inspection by the CFTC.

Finally, swaps are subject to certain reporting obligations under the Act. Where one of the parties to a swap is registered as a swap dealer or major swap participant under the Act, that party automatically is required to comply with the reporting obligations. However, if neither party is registered as a swap dealer or major swap participant, the Act establishes a hierarchy to determine which party is required to undertake the reporting responsibilities. In cases where both parties are at the same level under the hierarchy (e.g., neither of them are financial entities and both of them are domiciled in the United States), the parties must agree as a term of the swap which counterparty is responsible for compliance with the applicable reporting requirements. Parties that lack the adequate resources or infrastructure to comply with the Act’s reporting requirements may engage the services of a third-party service provider to perform these responsibilities, although the ultimate responsibility for the reporting requirements continues to reside with the designated reporting party. In connection with uncleared swaps, reporting obligations generally consist of reporting “creation data” to a “swap data repository” (“SDR”) registered with the CFTC, as well as “continuation data” and quarterly “valuation data.”

16. Limits on Liability

A limitation on liability is common in sophisticated legal contracts for the obvious reason that the limits allow parties to quantify maximum exposure for accounting and risk assessment purposes. In a wind or solar PPA, there are two common types of limitations:

The first type of limitation relates to liquidated damages provided in the agreement for certain events, such as delay in achieving COD or falling short of guaranteed availability, or general limits for all liability

under the PPA. The limit amounts for specific events or a specific failure to perform are typically set at an amount agreed by the parties to compensate the non-defaulting party for the harm caused by the event or failure to perform. General limits on liability are usually set high enough to be triggered only in extremely unlikely events, while capping exposure in those events.

The second type of limitation relates to legal concepts such as consequential, indirect, special, and punitive damages. These damages are often waived by both parties as a means of limiting risk to the parties.

17. Termination Rights, Events of Default, and Force Majeure

Events of default are defined to include breaches of the agreement, either in the form of misrepresentation or failure to make payments, provide security, or perform certain covenants, as well as certain other exigent circumstances, such as bankruptcy. Each party is given a limited opportunity to cure some events of default it may cause, which may be extended if cure is being diligently pursued, after which time the non-defaulting party will have the right to terminate the agreement if the event of default remains uncured. Financing parties typically are given the ability to independently cure events of default as well, subject to timing limitations before termination rights accrue.

Both Virtual and Physical PPAs typically include termination rights if force majeure events that prevent contract performance persist for an extended period of time.

18. Other Standard Terms

Given the importance of the PPA to both the Buyer and Seller, C&I PPAs typically contain a robust set of complimentary rights, obligations and other standard terms and conditions. These additional contractual terms and conditions include company representations and warranties, limitations and obligations regarding contract assignment, reporting requirements, provisions regarding changes in law, indemnification, confidentiality, and dispute resolution. Many of these terms are similar to what is found in Physical PPAs with utility customers.

GLOSSARY

Ancillary

Services:	Services related to the generation and delivery of electric power other than generation, transmission, or distribution. Ancillary services related to transmission services include energy imbalances, scheduling and dispatching, load following, system protection, and reactive power.
Busbar:	An electrical conductor, maintained at a specific voltage and capable of carrying a high current, usually used to make a common connection between several circuits in a system
C&I:	Corporate and Industrial
COD:	Commercial Operation Date
CP:	Conditions Precedent to the full effectiveness or delivery term of the PPA
Dodd Frank:	The Dodd-Frank Wall Street Reform and Consumer Protection Act
Hub:	A settlement location consisting of an aggregate of pricing Nodes developed by an RTO for financial and trading purposes
ITC:	Investment Tax Credit
MW and MWh:	Megawatt and megawatt-hour
Node:	A specific electrical location where settlement prices are calculated by the RTO
O&M:	Operation and Maintenance
PPA:	Power Purchase Agreement
Project:	Refers to wind and solar electric generation facilities for purposes of the PPA Guidebook and Outline of Key Terms
PTC:	Production Tax Credit
REC:	Renewable Energy Credit
RPS:	Renewable Portfolio Standards
RTO:	Regional Transmission Organization