



White Paper: Introduction to Off-Site Solar Power Purchase Agreements for Small to Medium Municipalities in Pennsylvania

This document is intended to provide an introduction for small to medium-sized Pennsylvania municipalities considering entering into an off-site Power Purchase Agreement for solar energy and would likely aggregate their electricity demand with other similarly sized municipalities. The intended audience includes municipal managers, local elected officials, environmental advisory boards, commission members, and volunteers.

Intro to Power Purchase Agreements

A Power Purchase Agreement (“PPA”) is a contract made between an energy project owner and a buyer for a long-term purchase of electricity (typically 15 – 25 years). Power Purchase Agreements for photovoltaic solar energy projects can deliver fixed-price electricity at competitive rates, limiting a customer’s exposure to electricity cost increases over time, while meeting climate change and environmental commitments without any upfront capital commitments.

An off-site PPA is a good tool for energy contract procurement for entities that lack the physical space for a sizable on-site project and/or do not have concentrated load. It is an especially useful model for government entities pursuing a solar PPA to use the third-party ownership model in order to take advantage of the federal Investment Tax Credit (ITC), which can only be captured by a taxable entity.

What Are the Drivers Behind PPAs?

Government entities and corporations are looking to PPAs as a tool to manage their current and future energy costs; and in the case of a solar PPA, are leveraging the renewable energy commitment to demonstrate climate leadership and achieve clean energy goals. A PPA allows for a buyer to participate in helping to get new renewable energy projects built, leading to “additionality”.

For example, in 2018 the City of Philadelphia introduced legislation and ultimately signed a Power Purchase Agreement to buy solar power from a Community Energy, Inc. project in Adams County, Pennsylvania. This action was driven by the City’s prior commitment to a Municipal Energy Master Plan that included a goal to have 100% of the City’s electricity come from renewable sources by 2030. The Master Plan was influenced by constituents and City officials with a desire to reduce energy use and the overall cost of energy, be more efficient with existing resources, and invest in new renewable energy. This first PPA will allow the City to power 22% of its buildings with renewable electricity. It will also give them an opportunity to demonstrate leadership as an innovator for other US cities.

Aggregating Demand from Multiple Municipalities

In order to make a PPA price competitive in today's market, at least 40 Megawatts (MW) of total annual demand for power is necessary to achieve meaningful economies of scale. A municipality might have a total load of only a few Megawatts. Therefore, potentially dozens of suburban municipalities would need to aggregate their individual demand to meet this threshold and make a PPA with a dedicated solar project financially viable for all parties involved.

Municipality Energy Contract Goals

Municipalities can choose how much solar power they want to contract for in the PPA. This could be 100% or as little as 20% of their overall load. This decision is up to the municipality. The City of Philadelphia chose to initially contract for 20% of their demand and, given their sizable load, meant that they were able to identify an approximately 70 MW project. For some smaller municipalities, anything less than 100% may not be worth the effort.

Types of PPA Structures

The municipality has several options on how they can structure an off-site PPA. Two most common structures are Physical and Virtual Power Purchase Agreements.

Physical Power Purchase Agreement: The municipality contracts for a long-term power purchase with a project in the same electrical grid region, and directly takes delivery of the power from the project. Two standard variations exist for how to implement a Physical PPA. Both solutions have several risks and complexities.

- A. **Direct Purchase.** It would be necessary for the municipality to become a wholesale buyer in order to take direct ownership of the energy from the project. This means becoming a PJM member and setting up a PJM sub-account. This may not be practical for most municipalities. The municipality would then need a Power Marketer licensed by the Federal Energy Regulatory Commission ("FERC") to take delivery of the power from the project and place in the PJM subaccount. The municipality itself could become a FERC-Licensed Power Market, but this is very impractical. Besides major utility companies and independent power producers, only very large energy users like Google have taken this step due to the amount of power utilized in their data centers. While this allows for additional captured value, it may not be possible for a small municipality with limited experience and resources.
- B. **Otherwise,** the municipality could contract with an already registered Load Serving Entity ("LSE") to take delivery of the power on their behalf. In this scenario, the municipality would execute an electric supply agreement with the LSE and the LSE would enter into a back-to-back contract with the project owner to take delivery of the power. Typical LSE contracts are 3-5 years, but a Physical PPA would be a minimum of 15 years. In this arrangement, the LSE would provide 100% of the power needed for the associated electric accounts. The LSE's contract with the renewable project would only account

for a portion of the cost of supplying power under the electric supply agreement with the municipality, and therefore only a portion of the municipality's electric costs can be fixed for the full term. Typically, the LSE can provide a 1-3 year fully fixed-price contract. After that term, the municipality should be able to either: (a) enter into another 1-3 year fully fixed-price contract, (b) shift to a partial-fixed contract, or (c) switch to another LSE.

Virtual Power Purchase Agreement: The municipality contracts directly with the project owner for the solar energy, and the arrangement is strictly financial. Because the municipality gets RECs associated with the solar energy generated by the project. The VPPA is essentially a floating price REC contract. There is no physical delivery of the energy, but instead a transaction of settlements between the seller and buyer based on market conditions, more specifically a Contract for Differences, where payments flow from customer to project OR from project to customer depending on the hourly Locational Marginal Price (LMP) in the PJM market. When the LMP is below the VPPA price, the customer pays the project the difference. When the LMP is above the VPPA price, the project pays the customer. The transaction does not impact the municipality's existing service with their utility and any contracts with LSE's or retail suppliers to service their actual electric demand.

The customer will still have its regular utility bill AND the VPPA transaction. The VPPA can be viewed as a REC contract with a floating price. It is a purely financial arrangement, sometimes the customer pays for the RECs and at other times the customer gets paid to take the RECs. As energy prices increase over time, it becomes more and more likely that the customer is the one getting paid.

Locating and Building the Solar Farm

Utility-scale solar farms that can compete with wholesale market prices typically take three to five years to develop and require large tracts of open land. It's unlikely that most municipalities have enough land within their boundaries to develop enough solar energy to meet their needs.

Instead, a municipality will want to identify a developer or project owner with experience in large solar projects, and potentially issue an RFP with several other similarly sized municipalities.

The Role of RECS and the Alternative Energy Portfolio Standard

As described by the United States Environmental Protection Agency ("EPA"), Renewable Energy Credits ("RECs") are the instrument that electricity consumers must use to substantiate renewable electricity use claims. A REC represents the property rights to the beneficial environmental attributes of renewable energy generation. A REC is used when one megawatt-hour (MWh) of electricity is generated and delivered to the grid from a renewable energy source. Because electricity is a flow of electrons, it's impossible to know where any particular electron came from, e.g., a solar panel or a natural gas plant.

RECs accomplish this tracking by assigning ownership to renewable electricity generation and use. RECs (including Solar RECs, or SRECs) can be bought and sold on markets.¹

In contracting for a solar PPA, a municipality will typically also contract for the ownership of the RECs. Although a municipality could choose to sell its RECs on the market, the municipality could not then claim credit for generating renewable energy.

The Alternative Energy Portfolio Standard (“AEPS”) is a Pennsylvania law that requires that the electricity generated in-state must include a percentage of renewable energy that increases over time. The current AEPS requires that in by 2021 (and beyond), at least 8 percent of Pennsylvania’s power must be generated by renewable energy, with at least 0.5 percent from solar.

Conclusion

Over the last few years many corporations and a few large cities and universities have stepped up to voluntarily procure renewable energy PPAs, which has sent a signal to government entities, institutions, and companies across the country. Small to medium sized municipalities in Pennsylvania can play an important part here too, and municipalities should consider a collaborative regional or statewide effort in order to maximize the impact of all commitments.

¹ Source: United States Environmental Protection Agency, <https://www.epa.gov/greenpower/renewable-energy-certificates-recs>