

HOW VIRTUAL POWER PURCHASE AGREEMENTS CAN ENHANCE CUSTOMER CLEAN ENERGY ACCESS

Virtual power purchase agreements (vPPAs) are a key purchasing option enabled by organized wholesale markets (OWMs). OWMs expand customer purchasing options while also helping decarbonize the grid through better integration of renewable resources, more efficient grid operations, and other benefits. Large energy customers situated in areas without OWMs have supported market expansion in order to unlock this purchasing option and enter virtual transactions within their own grid region.

A vPPA can be an effective option for energy customers to address their energy needs at scale when other purchasing options can't. Physical power purchase agreements (PPAs) can provide scale but require state-level retail access. In addition, energy customers must be registered in the electricity market and engage in power marketing/scheduling services to execute a physical PPA, adding time and cost to a project.

Green tariffs or utility clean energy subscriptions are not offered by every utility, and negotiating new programs may require a long lead time.

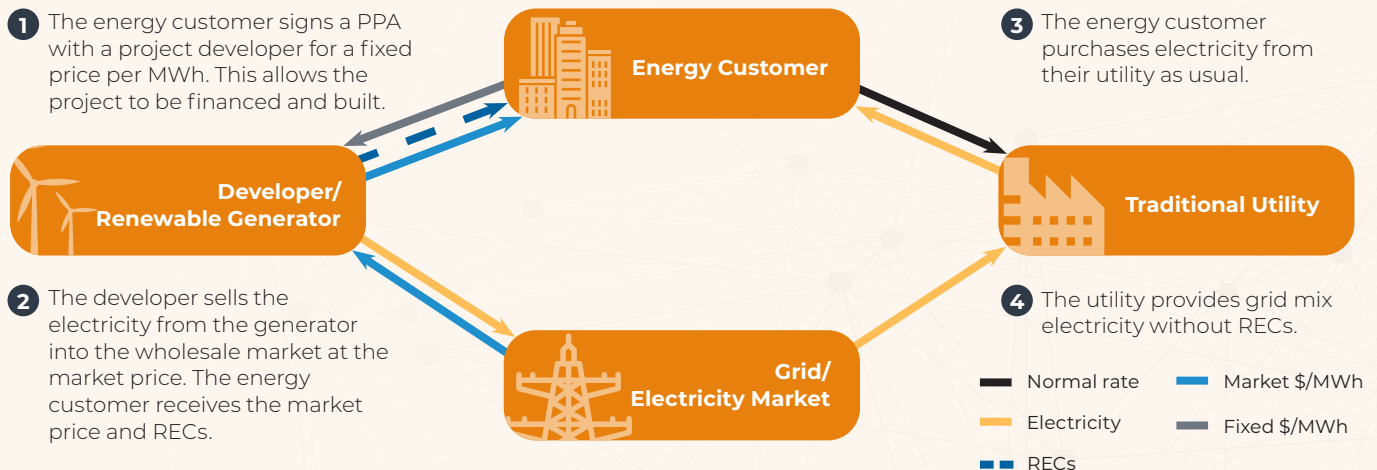
Onsite energy projects may not be at a large enough scale to meet customer goals, or a customer's site may not be suitable for projects. Where OWMs exist, clean energy developers have an open platform for selling clean energy from their projects, making it easier for them to develop projects and work with large energy customers through a vPPA.

HOW DO VPPAS WORK?

A vPPA involves a contract between a large energy customer and a clean energy developer. The contract establishes that once the project is built, the energy customer agrees to pay the developer a fixed (or "strike") price per megawatt-hour (MWh) of electricity produced. This guaranteed cash flow enables the developer to secure financing for the energy project. The project's output is sold into an OWM, and the energy customer receives the market price for the electricity produced.

VIRTUAL POWER PURCHASE AGREEMENT (VPPA)

Also known as a financial PPA, synthetic PPA, fixed for floating swap, or contract for differences



If the market price (which is variable) is lower than the fixed price, the energy customer will make a payment to the project owner. If the market price is higher than the fixed price, the energy customer will receive income. The energy customer also receives the environmental attributes, such as energy attribute certificates (EACs) or renewable energy certificates (RECs), associated with the energy generated.

As a financial contract, a vPPA does not supply the customer with physical supply of electricity and does not alter existing utility agreements to supply electricity to the customer's facilities. Because of this structure, a large energy customer does not need access to an OWM to enter a vPPA, only the developer does. However, when large energy customers enter into a vPPA outside of their local grid, they are still able to financially support new clean energy projects.

The ability to contract for a vPPA in a customer's OWM allows customers to drive emissions reductions closer to their operations and may provide a hedge against their energy costs.

ORGANIZED WHOLESALE MARKETS EXPAND CUSTOMER PURCHASING OPTIONS

Even though a vPPA is a bilateral contract between a developer and a large energy customer, several elements of OWMs are needed to support these transactions. The ability of the developer to participate in a wholesale market and access transparent pricing is foundational.

Regional transmission organizations (RTOs) and independent system operators (ISOs) are OWMs that produce and report locational marginal pricing that reflects the value of electricity within different zones based on load, generation, and limits on the transmission system. RTO/ISO data creates more transparency and allows energy customers to make educated decisions and perform due diligence on their projects.

Other elements of RTOs/ISOs can assist buyers in managing risk and may not be available in day-ahead markets alone. For example, RTOs/ISOs offer convergence bidding, a market mechanism allowing a participant to make

sales or purchases of energy in a day-ahead market with a requirement to buy back or sell back that energy in the real time market. This mechanism helps close the gap between real time and day ahead prices, while also increasing market efficiency. For those seeking a vPPA, convergence bidding can also be an important tool for hedging congestion risk.

RTOs/ISOs can also develop trading hubs that aggregate pricing across several price points and increase stability. Many vPPAs settle against hubs to reduce variability in their arrangement and reduce basis risk.

In addition to supporting vPPA purchasing, RTOs/ISOs create more robust markets for clean energy. RTOs/ISOs generally allow more developers to enter the market, driving more competition and greater clean energy integration. This can expand customers' purchasing options by creating more choice among clean energy developers. Large energy customers have also noted markets with more energy developers are able to offer more innovation in their projects and contract structures.

HOW ARE LARGE ENERGY CUSTOMERS WORKING TO EXPAND MARKET ACCESS?

Large energy customers are an active voice in regional markets, expressing their demand for clean energy. Energy customers in the commercial and industrial sectors have contracted [more than 71 GW of carbon-free energy](#) since 2014, equivalent to more than 40% of clean capacity added to the grid during that time. In the West, large energy customers are shaping the development of OWMs by engaging in the development of day-ahead market design to maximize the benefits these markets provide. Across both the West and the Southeast, large energy customers urge state decision makers find pathways to establish RTOs/ISOs that align with CEBA's [organized wholesale market principles](#) and expand clean energy purchasing options, including enabling greater access to vPPAs.