CHAPTER

4

Green Power Product Options

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DOCUMENT MAP

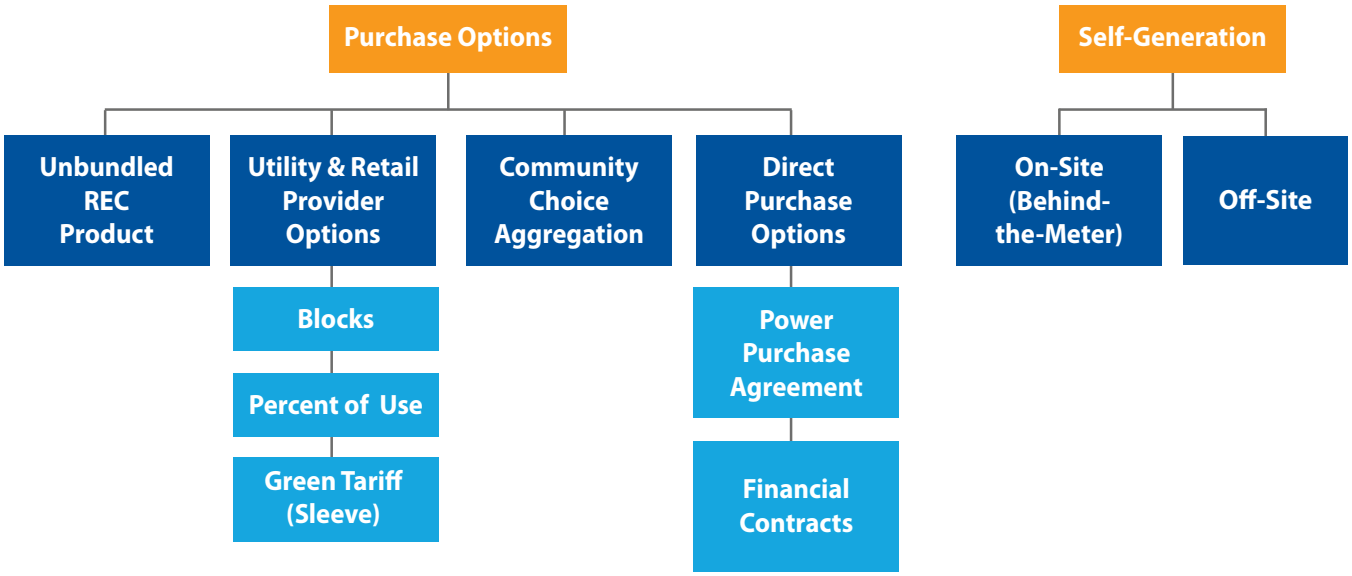
Green power can be procured in several different ways, however, all forms of green power supply and consumption include renewable energy certificates (RECs). If an organization chooses to purchase green power they may procure it from a local distribution utility, from competitive power suppliers, or directly from a renewable energy generator, depending on regulatory conditions in the state. Even in states where there are no green power retail suppliers and the utilities do not offer a green power option, any organization in the United States can buy RECs as a stand-alone product, "unbundled" from the organization's electricity purchases. For organizations considering owning or leasing green power generation facilities, the energy resources (e.g., solar, wind, biomass) available at the proposed generation site are an important initial consideration in determining a project's feasibility. Self-generation is not limited to on-site opportunities such as rooftop solar photovoltaic. Large organizations in particular might consider owning off-site generation where project siting may be more cost-effective and resource options more abundant.

The range of supply options in the market provides considerable flexibility. Organizations can consider factors such as price, long-term cost savings, generation resource type (e.g., wind versus solar), ease of procurement, the direct and indirect effect of their demand-side choices, and the location of the generating facility in their purchasing decisions. With these choices, organizations can usually find a green power product that will meet their desired goals.

Chapter 2 introduced the REC and emphasized its role as the tracking and accounting instrument for generation and use of renewable energy. As the basis for claiming and allocating the usage of renewable energy and its environmental attributes, ownership and retirement of RECs are essential with each green power option discussed in this chapter and all green power purchasing options in the United States. As discussed in more detail below, RECs are also offered as a stand-alone purchase option or product. When discussing these options and RECs in particular, it is important to clarify when one is referring to RECs as a tracking instrument essential to all green power product options, or to RECs as a stand-alone or unbundled product offering. It is also important to note that all supply options include RECs which convey ownership of the attributes and the right to claim renewable energy usage on a shared grid.

This document identifies six general green power supply options, including four types of green power purchase options and two types of self-generation options, as shown in Figure 4-1. Several of these options are described in more depth in Appendix B, Commercial Solar Financing Options.

Figure 4-1. Voluntary Green Power Supply Options



Purchase Options

Unbundled REC Products

Customers can buy green power in any quantity of megawatt-hours by purchasing RECs separately from electricity – an unbundled product option. Purchasing a standalone REC product allows organizations to effectively self-bundle the renewable energy attributes associated with the RECs with the organization's consumed physical electricity. This is in contrast to a supplier that sells a green power product that includes both the electricity and RECs bundled together, as in the case of either a retail green power product from your electricity supplier (i.e., utility) or alternatively through the direct purchase from a specified generator.

In purchasing unbundled RECs, organizations can claim receipt of the environmental attributes of the REC-generating facility (or facilities) without affecting their physical electricity purchase and delivery options. Unbundled REC purchases can be scoped to meet an organization's electricity usage over any period of time, but monthly and annual contracts have historically been the most common transaction periods. Unbundled purchases may also be arranged as a percentage of monthly or annual electricity consumption or as a long-term fixed price contract.

Unbundled products provide versatility, making renewable electricity available to all grid consumers regardless of the location of the generator or consumer on the grid. Unbundled RECs also offer purchasers the flexibility to purchase renewable energy from any provider rather than being limited to a local electricity supplier. This expanded availability and ease of participation creates a larger market that supports market efficiencies, scalability and lower transaction costs, because a single REC purchase can cover a wide operational footprint through a single transaction. Due to their ease of acquisition, unbundled REC procurements often serve as an entry point for organizations entering the green power market. As they gain experience, organizations may become more interested in other supply options, such as self-generation or direct purchase from a green power project, in order to achieve cost savings or to have a more direct impact on increasingly incremental supply. Organizations may also pursue a combination of supply options that includes unbundled RECs to cover certain parts of their operations.

Purchasing unbundled REC products provides significant flexibility but also entails net premium expenditures in addition to electricity costs incurred by the organization, so this option does not yield cost savings. Because unbundled RECs are separate from electricity purchases, they cannot help purchasers hedge against increases in future electricity costs.

Dual Purposes of Renewable Energy Certificates

A REC is a tradable certificate that represents the generation of 1 megawatt-hour (MWh) of electricity from a renewable energy source. RECs serve two distinct purposes. One is as a tracking instrument essential to all renewable energy and environmental claims. The other is as a product option that may be purchased separate from electricity.

RECs as Accounting Instruments: All green power purchases are based on the ownership of RECs, which represent the environmental attributes associated with green power. Hence, an organization's claim that it uses green power can be substantiated only through the ownership and retirement of RECs. If an organization uses electricity from a renewable resource without also owning and retiring the REC, it is not considered to be using renewable electricity. Some renewable energy projects are not formally issued RECs by a tracking system and in these cases the project still produces environmental attributes in megawatt-hour increments that must be owned in order to substantiate green power use.

RECs as a Product Option: RECs may be purchased separate from electricity ('unbundled") as a way to buy green power. Organizations that buy unbundled RECs match them to all or a portion of their electricity used and may claim to be using green power with the attributes of the RECs.

Utility Retail Options

Customers may be able to buy green power from their local electricity supplier. Green power is an optional service offered by many utilities and competitive suppliers to allow customers to support a greater level of investment in renewable energy, often by paying a premium on their electric bills. In some states where retail electric choice is permitted, customers can switch electricity service providers if their current provider does not offer a green power product.

Utility supply options involve the sale of both the RECs and electricity as a single commodity product within the same utility bill. Some utilities may buy unbundled RECs and bundle them with their electricity service as green power. In some cases, the renewable electricity generator could be owned either by the utility itself or by a third party, but the customer purchases the REC-substantiated electricity from the utility. With the first two utility product options below, the transaction process is easy, but the product is usually sold at higher cost than conventional electricity supply. The third option below demands more involvement and transactional effort, but may afford other benefits. Utility product options typically include the following:

- A block option is a fixed energy quantity, often 100 kilowatt-hours, of 100 percent renewable electricity, offered for a fixed monthly price. The price is usually expressed as a price premium above the price of conventional power. Customers usually can sign up for as many blocks as they desire.
- Percentage of monthly use is an approach whereby customers may choose green power in an amount based on a fixed percentage of their monthly electricity use. In practice, this usually results in the purchase of blended green and conventional power, unless the customer chooses 100 percent green power. This is typically priced as a premium on a "cents per kilowatt-hour" basis over the standard rate. The monthly cost for these products varies with use and the percentage of green power chosen.
- A green tariff describes an arrangement by which regulators authorize a utility to negotiate a long-term contract for green power with an individual large customer. The traditional green tariff form is sometimes called a "sleeve" because it is a contract within a contract: the utility enters into a long-term contract with a third-party green power generator, and in turn contracts with the customer to purchase the RECs and electricity. Green tariffs can take several forms under a green tariff arrangement with the utility, renewable generator and green tariff customer taking different roles relative to each other in the transaction.

  In "sleeve" contracts, the utility provides the balancing power, distribution infrastructure and transactional services to the customer served by the green tariff. In this way, the utility meets its customer demands and retains revenue, while the customer can access green power without regulatory and transactional constraints.

  Some utilities have begun using a new form of green tariff, where the utility procures the long-term contract with the third party green power generator and allows multiple large customers to sign up for just a slice of the larger project. With these products, customers all have the same commercial terms and do not negotiate as many complexities.

  In states where retail access to generators is not authorized, green tariffs are an effective way for utilities to facilitate renewable electricity purchases for their customers. Usually, the utility is required to recover all costs of the long-term contract with the third party green power generator from the purchasing customer, to ensure that other utility customers do not bear any of the costs (or share the benefits) of the long-term contract.

Community Choice Aggregation (CCA)

A CCA is formed in accordance with a state policy that enables local governments to aggregate electricity demand within their jurisdictions and contract for electricity supply (often renewable energy) to serve that demand. Meanwhile, the existing electric utility maintains transmission and distribution services. CCAs are not authorized in all

states. As of this writing, they are authorized in California, Illinois, Massachusetts, New Jersey, New York, Ohio and Rhode Island.

The CCA often sources local renewable energy generation, contributing to the support of local employment and economic development. Depending on the renewable sources, aggregated demand and state incentives, the electricity rates of the CCA may add or remove net expenditures to an organization's electricity bill. In most cases, all customers in the CCA community participate by default, unless they choose to "opt out" of the program. Local governments periodically reassess CCA costs and benefits and can either modify or stop offering CCA contracts altogether. Hence, it is important to note that the availability of CCAs in the long-term is unknown and decisions regarding the green power itself are out of the control of the electricity consumer. Some CCAs have also been known to buy renewable power that traditionally has not been desired by the voluntary green power market.

Case Study: Engaging a Utility One-on-One to Achieve an Organization's Specification

Google has worked with its local utilities to negotiate customized one-on-one renewable off-takes, resulting in the purchase of 48 MW of wind energy from the Grand River Dam Authority (GRDA) for Google's Oklahoma data center, and up to 407 MW of wind from MidAmerican Energy for its Iowa data center facilities. Instead of Google buying energy directly (via a power purchase agreement (PPA)) from the developer who built the wind farm, the utilities enter into PPAs with local wind farms, and Google has agreed to a long-term purchase agreement with the utilities—essentially, a PPA within a PPA, or a sleeve contract. This approach places responsibility for integrating the output from the wind farms on the utility. The agreement calls for Google to pay GRDA a premium for the renewable energy.

Direct Purchase Options

In some states, organizations can contract directly with a specific third-party owned generator to obtain green power. Direct purchase options include both physical power purchase agreements (PPAs) and financial PPAs. Both types of arrangements offer an organization a tangible and clear association with a specific renewable energy facility.

Physical PPA. PPAs are long-term contracts (often 10 to 20 years, but sometimes longer or shorter) between the organization purchasing renewable electricity and a party that generates that electricity. The renewable energy generator can be on-site or off-site, but the buyer must be located in the same power market to allow for physical delivery of electricity. The contract specifies the electricity price (generally a long-term rate with a price escalation clause), the schedule for the delivery of electricity, and the transfer of RECs from the generator (seller) to the purchaser. The purchaser must ensure the RECs are included in the PPA for the electricity to be considered renewable and to substantiate green power use and environmental claims.

Physical PPAs are not available in all markets due to state regulations. In states without retail access, end-use consumers are not allowed to purchase directly from green power generators. Also, solar installers may be reluctant to offer third-party ownership and solar PPAs in states that do not shield them from regulation as a utility. Purchasing organizations will need to determine from state utility regulators whether PPAs with non-utility owners are an option. The benefit of PPAs are that they require little capital investment on the part of the purchasing organization, offer certainty of electricity cost and allow for the accrual of savings often within the first year.

It should be acknowledged that physical PPAs also present risks to the purchaser because they are a bet that future electricity prices will be higher than the PPA negotiated price. If electricity prices go lower than expected, the purchaser will forgo savings. Organizations could find that they are stuck with a PPA price that exceeds what others are paying. The underlying assumptions that go into determining the PPA price are often key to whether it will offer savings to the purchaser organization.

Financial PPA. A financial PPA, also known as a virtual PPA (VPPA) because the energy is not delivered to the buyer, is a long-term contract in which a generator and purchaser agree on a reference electricity settlement price (the "strike price," which may include an escalator rate). The electricity generated by the project is sold into a wholesale regional power market where the generator is located rather than delivered to the buyer, and therefore the buyer's consumption of electricity can occur in a different power market than where the renewable energy generator is located, including in a traditionally regulated retail electricity market.

In a financial PPA, any difference between the settlement price and the wholesale market price is balanced by both transacting parties over the life of the contract. On a monthly basis, if the generator earns more from the wholesale market than the strike price, it pays the extra revenue to the purchaser; if the generator earns less than the strike price, the purchaser makes up the difference to the generator. Hence, this option is also referred to as a contract for differences.

The financial PPA is a hedge for both parties, ensuring fixed revenue to the seller and fixed costs to the buyer. As a green power purchase option, a financial PPA of necessity must convey RECs to the buyer. In essence, a financial PPA is a hedge against rising electricity prices combined with an unbundled REC contract, where the cost of RECs varies depending on the difference between the wholesale market price and the agreed upon settlement price. In order for the contract to have a hedge value, there must be correlation between the wholesale market where the renewable energy project sells its electricity and the retail market where the buyer consumes their electricity.

As with a physical PPA, a financial PPA does not protect the buyer against the risk of lower retail electricity prices. (Similarly, the seller is protected against lower wholesale market prices, but would miss out on extra revenue from higher retail electricity prices.)

Some of the advantages of financial PPAs are as follows:

- Organizations may be able to obtain long-term cost stability even when they are located in states that do not allow retail choice and they lack authorization to transact physical PPAs in the market where they operate.
- The organization entering a financial PPA can continue to purchase electricity at retail from its usual supplier.
- If the financial PPA is undertaken with a project under development, it may support a strong claim of directly adding new green power capacity and can be used by the developer to help secure project financing.

Financial PPAs also have some risks:

- If the strike price is consistently above the wholesale market price, the purchasing organization will be constantly making up for the generator's generation revenue losses.
- If the parties are located in different regions, it is important that the retail price the buyer pays for electricity is influenced in the same direction as the movement in wholesale market prices that the seller receives. Stated another way, the price of electricity in the wholesale market where the renewable generator is located and the retail electricity price of the organization's operational use of electricity must have a high degree of price correlation for the purchasing organization to realize an economic hedge.
- Even if the parties are located within the same region, if the region uses locational marginal pricing to value energy depending on supply and congestion, the parties may face different prices depending on each parties' sub regional locational marginal pricing. Again, it is easier to agree on a strike price when the prices that both parties face move in parallel.
- There is a difference in value to the grid between energy delivered by the generator to its nearest node and energy that is delivered to a transactional market hub. It is often desirable that the purchasing organization negotiate the strike price at the hub to remove the cost and risks associated with power delivery.

From the purchasing organization's perspective, the keys to a satisfactory financial PPA are to:

- Make sure both parties to the financial PPA face the same wholesale electricity markets so that the retail price paid by the buyer is correlated with the movement of wholesale market prices where the generator is located.
- Understand that a low strike price benefits the purchaser because any revenue from energy sales earned by the generator must be paid to the purchasing organization.
- Evaluate carefully all assumptions in determining future prices. This requires an understanding of how the wholesale electricity market operates, as well as the expertise to develop realistic expectations about future wholesale prices.

- Diligently negotiate the price and allocation of the risks associated with power delivery because the organization is not receiving the power directly.
- Be aware that if the wholesale price falls, that benefit will not be available to the purchasing organization because it will have to pay the difference between the low market price and the agreed upon strike price, while competitors in that market may be getting lower electricity prices. It is a choice between paying the same as everyone else (regardless of price volatility) and hedging against rising electricity prices.

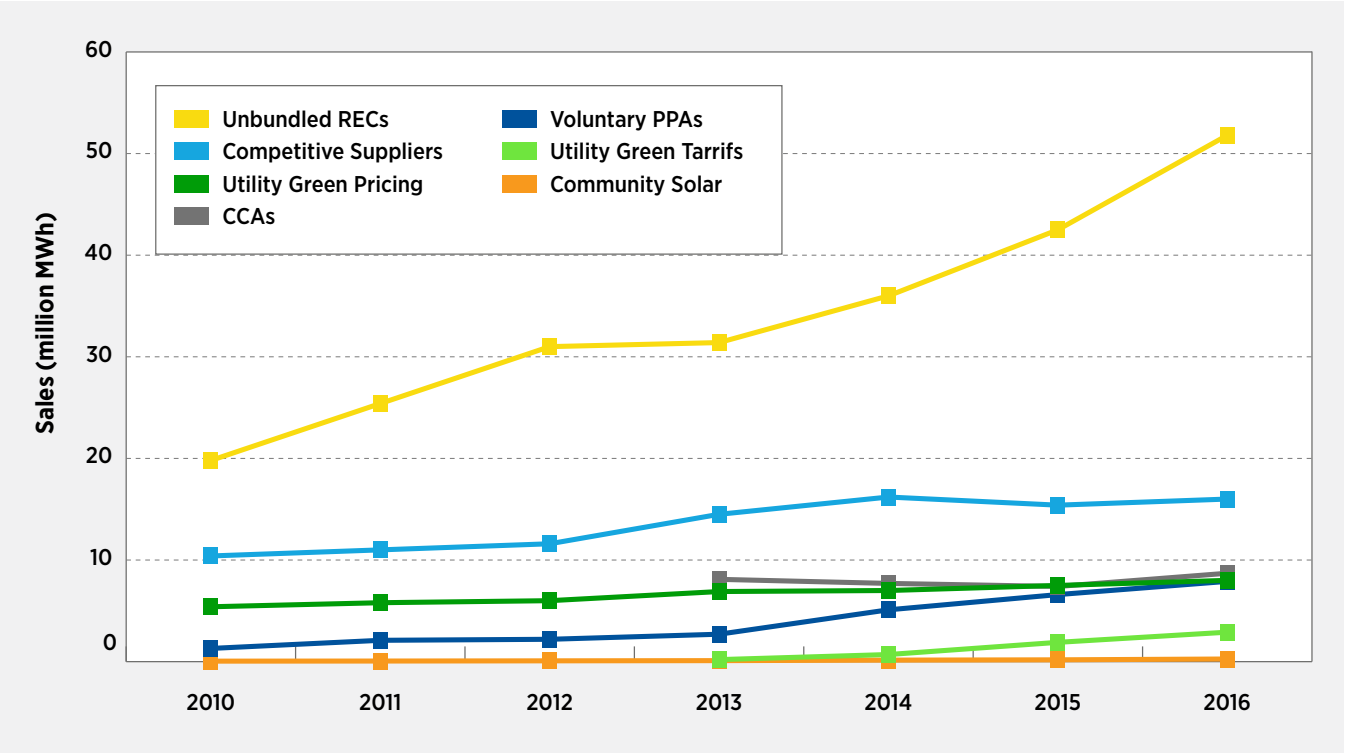
Table 4-1 breaks down the sales of green power by the four major green power purchasing types in 2016. These sales do not include self-generation options, which are discussed in the following section. Of the several different green power purchasing options, unbundled REC products are the most popular voluntary market sales option. Figure 4-2 shows the use of these options over the past several years in terms of total sales volume. It is important again to reinforce that all these supply options involve a REC to substantiate the options as green power.

Table 4-1. Voluntary Green Power Sales in 2016 (MWh)[1]

Options for Purchasing Green Power	
Unbundled REC Products	51,800,000
Utility Retail Options	26,989,000
Community Choice Aggregation	8,378,000
Direct Purchase Options	8,149,000
Total	**95,450,000**

[1] O'Shaughnessy, E., Heeter, J., Cook, J., and Volpi, C. (2017). *Status and trends in the U.S. voluntary green power market (2016 data).* National Renewable Energy Laboratory. Retrieved from https://www.nrel.gov/docs/fy18osti/70174.pdf

Figure 4-2. Green Power Sales from 2010 to 2016[2]



Self-Generation Options

In addition to purchasing green power, organizations can own or lease and generate green power either on-site at their own facilities (behind the meter) or at an off-site location.

Green power technologies for self-generation include solar photovoltaics, wind power, fuel cells and electricity storage that use renewable fuels. Large facilities sited near a municipal landfill or sewage treatment plant may be able to use recovered methane gas for on-site electricity and/or heat production. The following describes each of these and additional options in more detail:

- **Solar.** Solar photovoltaic (PV) systems can be scaled to almost any size from a few kilowatts up to many megawatts. PV systems may either be ground-mounted or rooftop-installed on schools, homes, community facilities and commercial buildings. They can be integrated into a building, displacing other building material costs, such as those for roofing shingles or car park shading.
- **Wind.** Wind turbines vary in height and blade sweep, with individual turbines having the ability to generate from hundreds of kilowatts up to several megawatts in capacity. Wind turbines may be best-suited for off-site applications. On-site installations are usually only possible in nonurban areas and often require zoning permits to exceed 35-foot height restrictions (a tower for a 250-kilowatt turbine is 130 feet high, with a blade sweep of 98 feet). Such installations usually require approximately 1 acre of land per turbine and wind speeds that minimally average 15 mph at a 150-foot height. In addition, placing turbines in urban areas is inadvisable because nearby buildings may create wind turbulence that can disrupt the turbines' performance.

[2] O'Shaughnessy, E., Heeter, J., Cook, J., and Volpi, C. (2017). *Status and Trends in the U.S. Voluntary Green Power Market (2016 data)*. National Renewable Energy Laboratory. https://www.nrel.gov/docs/fy18osti/70174.pdf.

- **Fuel cells and electricity storage technologies.** Fuel cells are another way of producing power. Some fuel cell technologies emit essentially no air pollution through the conversion of the fuel into electricity, but the electricity they produce cannot be considered green power unless they operate on a renewable energy-produced fuel source, such as landfill gas or hydrogen derived from PV or wind power. Fuel cells are similar to other electricity storage technologies in this respect.
- **Landfill and wastewater methane gas.** Methane gas derived from landfills or anerobic digesters at wastewater treatment plants, livestock or agricultural operations, or organics (e.g., food waste) management facilities can be used to generate electricity. The methane gas is converted to electricity using an internal combustion engine, gas turbine, direct combustion boiler and steam turbine generator set, microturbine, or other power conversion technologies. Most methane gas projects produce from 0.1 to 4 megawatts (MW) of electrical output with many landfill methane projects generating in the 5-20 MW range and some as large as 50 MW.
- **Biomass**. Biomass is plant material burned in a boiler to drive a steam turbine to produce electricity. Biomass systems can also be good for producing combined heat and power at facilities with large thermal loads. Biomass projects are best suited to locations with abundant biomass resources (often using waste products from the forest industry or agriculture). Although biomass is considered a renewable resource, it may have air emissions impacts. Furthermore, not all biomass is eligible under voluntary market certification standards. Buyers of biomass-based green power should consult with program administrators and third-party certification programs to determine criteria for eligible biomass resources.

Case Study: Reducing the Cost of Green Power through Virtual Net Metering

It pays to know and take advantage of state financial and regulatory incentives. Some states allow virtual (or remote) net metering, where the renewable generator is off-site but the output can nevertheless be credited against the customer's electricity bill through an accounting reconciliation. Some states offer group net metering, where multiple owners can share in the billing credits from a single off-site project. In Massachusetts, municipalities and other governmental entities can receive billing credits for an off-site installation they don't own if they are the "host customer," meaning they are assigned 100 percent of the output. UMass-Boston is using this virtual net-metering rule to purchase the output from a 3.9-MW solar installation at Boston Business Park, home to several warehousing and distribution companies. The PV array is owned by Altus Power America, which sells the energy produced to UMass-Boston through a net-metering credit purchase agreement. UMass-Boston will avoid up to $5 million in energy costs over the next 20 years. The electricity is not considered self-generated because the university does not own the solar project.

Self-generation of green power can occur on-site (within the organization's facilities at the point of consumption) or off-site. Under both scenarios, the organization must retain ownership of the RECs in order to claim the use of renewable electricity.

On-site Generation

On-site renewable generation is a visible demonstration of the organization's environmental commitment. Generating power on-site also offers control over electricity expenditures. However, even though the project is on-site and providing electricity to the owner, the organization must either retain and retire the RECs to claim that it is using renewable electricity from the on-site project or replace any self-generated RECs that are sold, in order to claim that it is simply using renewable electricity based on the replacement REC attributes. (See REC Arbitrage on pp. 4-11)

In many states, excess electricity generated from on-site renewable generators may be sold back to the grid at the same price at which power is bought (or at the price of wholesale power), through a policy option called net metering. Net metering is a cost recovery policy that helps improve the financial return for qualifying on-site renewable power systems, although net metering is often limited to smaller behind-the-meter installations. For example, the state of California limits on-site generation systems to 1 MW (or up to 10 MW for up to three biogas digesters) and the total aggregate generation of all net-metered systems' capacity may not produce more than 5 percent of a utility's peak demand.

If energy storage is incorporated into on-site system design (and energy storage technology costs are declining), on-site renewable generation can serve critical loads when power from the grid is interrupted, as well as when the renewable resource is not available. This ability to operate independently of the power grid can be a great advantage and contribute to project economics where grid stand-by or demand charges may be high.

REC Arbitrage

The price of RECs may vary depending on market dynamics, such as supply and demand, and market policies, such as renewable energy mandates with which utilities must comply. If there is a significant discrepancy between REC prices in the voluntary and compliance markets, an organization may be able to leverage these differences to its financial advantage by selling its eligible renewable energy project's RECs for a higher price in a compliance market and purchasing replacement RECs from another renewable project at a lower price. This is commonly referred to as REC arbitrage (also a REC swap).

This opportunity could arise in the case of self-generation, as well as where an organization purchases power directly from a generator, as in a PPA. In either case, the REC owner has the choice to keep the RECs or sell them into a compliance market where the REC value is greater. However, if the organization sells the RECs and buys replacement RECs, it would have to claim the attributes of the replacement RECs rather than the attributes of the generator that supplied the energy.

For more information on REC arbitrage please see the U.S. EPA's guidance document titled "Renewable Energy Certificate (REC) Arbitrage." https://www.epa.gov/greenpower/renewable-energy-certificate-rec-arbitrage

Off-site Generation

Under certain circumstances, organizations may prefer to own renewable electricity technologies off-site, away from their own facilities. If the off-site generation is owned by the consuming organization, the RECs produced can be retired by the organization and used to substantiate green power use claims. Similar to owned on-site generation, the organization can sell those RECs for additional revenue; however, doing so would negate the organization's ability to claim it is using green power, unless replacement RECs are purchased.

An organization may find advantages in owning off-site generation rather than on-site generation:

- **Resource availability.** Off-site generation projects might perform more favorably and produce more electricity due to the site's renewable resource characteristics. The organization could own a renewable generator in an area with better access to renewable resources, thereby maximizing the return on investment.
- **Better match to green power needs.** Land may be more available and cheaper off-site, allowing a larger generating project that more closely matches the organization's need for green power.
- **Easier permitting and regulation.** Regulations and permitting laws could be more flexible in some cases for an off-site electricity generation site. Zoning and safety laws with respect to proximity to other buildings and development are some of the key factors that could restrict on-site power generation at an organization's facility.
- **Utility benefits.** Locating a generation facility elsewhere on the grid may provide benefits to utility operations. In some cases, the utility may provide incentives to locate generation in specific areas to help solve reliability or congestion issues.
- **Economic benefits.** Organizations may choose off-site generation options in areas where they can sell the power at higher prices, where renewable incentives are stronger, or where there is greater opportunity for REC arbitrage.

Shared Renewables

Shared renewables projects, such as community solar, are an emerging off-site generation option that may allow an organization to purchase a share of a renewable energy system within its utility service area. For organizations that have rooftops unsuitable for self-generation and have cash flow or institutional constraints that prohibit ownership

of renewable power equipment, shared renewables (particularly solar and wind) give access to the benefits of owning renewable power at a more affordable upfront cost. The organization will typically receive utility bill credits and possibly the associated RECs produced from its share of the shared project output. Shared renewables may be implemented in a variety of ways, however, including arrangements where the consumer purchases, rather than owns, a share of the output. Also, some utilities offer green power retail options under the "community" or "shared" renewables nomenclature. Not all shared renewables options necessarily provide RECs to their participants. Therefore, an organization should carefully review the contractual terms, and perhaps the policy landscape, before investing in the project. If an organization does not receive the RECs associated with the shared renewables project, then it cannot claim to be receiving or using green power. Similarly, it is deceptive for shared renewable energy providers to sell generation or generating credits from their project as "green power" or "renewable energy" if the project owner does not convey the associated RECs to the project shareholders.

Green Power Supply Options Summary

Table 4-2 summarizes the seven main options for procuring green power, including both renewable purchasing options and self-generation options. The table compares each option based on the parameters of capital investment cost, terms of commitment and transaction complexity.

Table 4-2. Summary of Supply Options[3]

Supply Option	Unbundled REC Products	Utility Supply Options	Community Choice Aggregation	Physical Power Purchase Agreements	Financial PPAs / Contract for Differences	On-site Self Generation	Off-site Self Generation
Upfront Capital Investment	None	None	None	None	None	$$-$$$	$$-$$$$
Ongoing Expenditures Relative to Incumbent Electricity Option	Cost premium	Cost premium; tariff may offer savings	Varies	Cost savings over life of contract	Cost savings over life of contract	Cost savings over life of project	Cost savings over life of project
Term of Commitment	Varies; significant flexibility	Monthly; multiyear for green tariff	Consumer opt-out provision	Multiyear	Multiyear	Operational life of installed technology	Operational life of installed technology
Transaction Complexity	✪	✪	✪	✪✪✪	✪✪✪✪✪	✪✪✪	✪✪✪✪
Transaction Includes	RECs only	RECs + Electricity	RECs + Electricity	RECs + Electricity delivery + fixed cost of electricity	RECs + Hedge against downside price risk	RECs* + Electricity + Generator	RECs* + Generator + Revenue from electricity sales

*Many smaller renewable energy projects are not formally issued RECs from regional tracking systems, but nonetheless still generate environmental attributes.

[3] Note that Shared Renewables are not included in Table 4-2, as they may be offered under several different supply options.