ENERGY STAR® PortfolioManager®

Technical Reference

Green Power

OVERVIEW

The U.S. Environmental Protection Agency (EPA) defines green power as electricity generated from renewable resources, such as solar, wind, geothermal, low-impact biomass, and low-impact hydro resources. Whereas energy efficiency measures may be implemented to reduce the overall energy use in your building, the purchase of green power helps to reduce the environmental impacts associated with the generation of electricity for use in your building. Green power may be obtained from either onsite sources (i.e., a solar photovoltaic panel at your property) or offsite sources (i.e., a wind turbine farm). The specific requirements for benchmarking and the resulting effect on your metrics depend on where the electricity is generated:

- Onsite Green Power. Onsite green power may be generated through solar photovoltaic panels or wind turbines located at your property. To benchmark, you will enter two meters: one to track how much onsite renewable electricity you use and export, and a second to track the electricity that you purchase from the grid. Because onsite renewable electricity generation is part of your building's energy requirement, it must be tracked; it is not sufficient to enter only grid-purchased/grid-sourced electricity. When you enter onsite green power, it is important that you indicate whether or not you own the Renewable Energy Certificates (RECs) that are associated with the green power you generate. You need to own the RECs to see the benefits of onsite green power in your source energy and emissions metrics.
- Offsite Green Power. Offsite green power is generated from projects that are not located at your facility (e.g., from a nearby wind farm). In some cases, the green power may be generated in an entirely different part of the country. To benchmark, you will enter a grid electric meter and mark that it is "green power." You then specify the quantity that is green and the location where it was generated. Because offsite green power does not directly lower your building's need for energy, it does not affect either site or source energy. You will see the benefits of offsite green power in the calculation of avoided and net emissions.

The only onsite green power meter types in Portfolio Manager are solar and wind, the most common forms of green electricity. You may have other forms of renewable energy at your building, such as geo-thermal heating and/or solar hot water. Portfolio Manager does not have specific tracking modules for these energy sources because it is not common or feasible to quantify their heat input. In these cases, you receive credit to the extent you lower your energy purchases. You also may buy RECs independent of your actual physical electricity. These purchases are typically made at a corporate level and are often not traceable to individual buildings. Because Portfolio Manager focuses on building metrics, there is no specific module for tracking these unbundled RECs at the portfolio level, but you may enter these purchases as offsite green power.

This document explains the benchmarking requirements and metric details in the following sections:

UNDERSTANDING ONSITE GREEN POWER

Onsite green power is electricity generated at your property from a renewable energy source such as solar or wind. There are two important principles followed in tracking onsite green power in Portfolio Manager:

- All energy use must be tracked to evaluate energy performance. You must track exactly how much renewable electricity you use, as well as how much electricity you obtain (source) from the grid. It is not sufficient to track only the grid-purchased electricity for the property, since it does not accurately reflect the total property energy use.
- REC Ownership must be tracked to properly evaluate environmental impacts. Your ability to claim the energy and emissions benefit associated with onsite green power depends on whether or not you own the Renewable Energy Certificates (RECs) associated with renewable energy produced by the system at your property. Your environmental benefit is affected by any sale of RECs, including REC arbitrage.[1]

How to benchmark

Portfolio Manager lets you to track two types of onsite green power: power generated from solar photovoltaic panels and power generated from wind turbines. These renewable sources of electricity are tracked with a unique "fuel type" or "meter type" in Portfolio Manager. The special meter type lets us collect additional pieces of information that are unique to onsite solar and wind systems and are required for accurate performance metrics.

If you have an onsite system, chances are you also get some electricity from the grid. For example, you may use electricity at night or at other times when there is not adequate supply from an onsite solar system. Therefore, you will need to enter two meters into Portfolio Manager: an onsite renewable electric meter and a grid electric meter. The colored arrows in *Figure 1* show the electricity flows that are captured in each of these two Portfolio Manager meters. The green arrows correspond to information about your onsite system (your onsite renewable meter in Portfolio Manager); the orange arrows correspond to information about energy from the grid (your grid electric meter in Portfolio Manager).

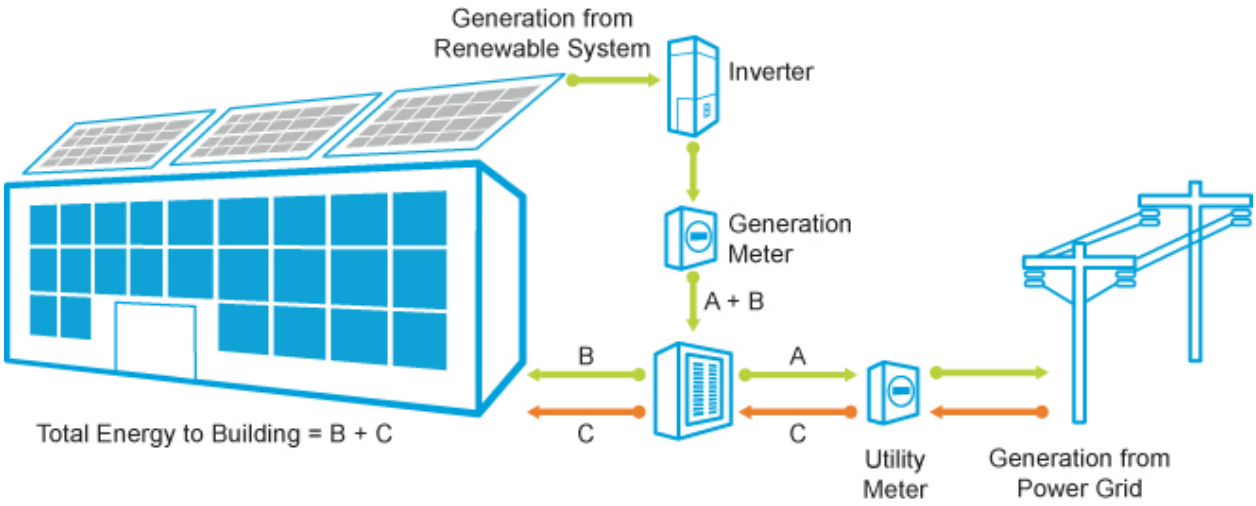
1. Onsite Solar or Wind Meter (Labeled as Flow A and B). This Portfolio Manager meter is used to track both the electricity that you use onsite and any electricity that may be exported back to the grid.
    - Electricity generated by your system and exported to the electric grid (Labeled as Flow A). Some onsite systems export electricity to the grid while others do not. For example, a small school may have periods during which the generation of the onsite system exceeds the building's demand and therefore is exported back to the grid. In contrast a large office building may never generate more electricity than it needs and therefore will not export electricity. If you export electricity, you must quantify your exports. This information might be obtained from a bi-directional digital electric utility meter installed at your property that measures flow to the grid. Some buildings may not be able to read this value from a physical meter on their site, but rather will find it on the utility bill. You may want to consult with the energy service provider or utility that assisted with your system installation to determine where you can find this export information.

[1] Renewable Energy Certificates (RECs) are tradable certificates that are widely used to establish environmental claims associated with buying or using green power. They represent the environmental, social, and other non-power qualities associated with the generation of one megawatt-hour of electricity from a renewable resource.

- **Electricity generated by your system and used at your building (Labeled as Flow B).** The energy you generate and use onsite is an important energy need that must be included in your energy performance metrics. If you do not export any electricity, then the total amount of electricity you generate will be equal to the amount you use at your building; this may be recorded on a physical meter at your property tracking total renewable generation. If you export electricity to the grid, then you may or may not have a physical meter tracking the amount of electricity you use. If you do not have a physical meter you may have to compute this value by measuring your total system generation (A+B) and subtracting any exports to the grid (B). You may want to consult with the energy service provider or utility that assisted with your system installation to determine where you can find this information about energy that is generated by your system and used at your property.

2. **Grid Purchase Meter (Labeled as Flow C).** This Portfolio Manager meter is used to track all electricity that is sourced from the grid, meaning all electricity (kWh) that flows from the grid to your building. If you do not export electricity, then your utility bill is your total grid electricity. If you do export electricity then you need to be very careful to include ***all*** energy that flows from the grid to your property, this is typically tracked via a bi-directional meter and reported on your utility bill. It is not sufficient to enter what is called a "net" meter which only shows you the difference between the energy you import from the grid and the energy you export (i.e., C – A). Although your utility may give you financial credit for exports (A), the total flow of energy from the grid into your building (C) is required for a complete assessment of your performance. It is common for utility bills to report the "net" value (C-A) and the export value (A). In this situation, you will need to compute C by adding these two values together. You may want to consult with your energy service provider or utility to determine how you can quantify C from your utility bill.

Figure 1 – Configuration of an Onsite Renewable System



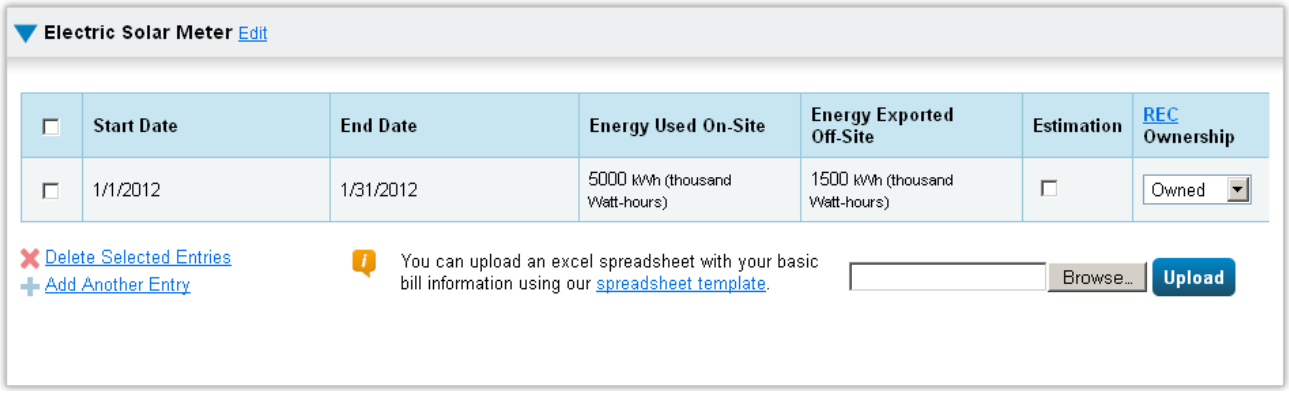
The Electric (Onsite Solar or Wind) Meter is a unique meter type in Portfolio Manager. *Figure 2* illustrates a meter consumption table for an onsite renewable meter. There are two extra fields that are unique to this meter type. First, there is the column used to track the energy exports offsite (either back to the grid or to a neighboring building). Second, there is a place to track the REC ownership associated with that month's electricity. There are three options

for REC Ownership: Owned, Sold, and REC Arbitrage. Note that you select your REC ownership option for each monthly entry. It is possible that you will sell your RECs in one year but retain them in the following year. Information on your REC ownership over time is critical to an accurate calculation of your GHG emissions benefit.

Recall that with green power, the energy and the RECs may be sold together (bundled) or sold separately (unbundled). In some cases, people sell the RECs associated with their onsite renewable energy generation and use the resulting sales revenue to help finance the installation and operation of the onsite system. Once the RECs are sold, the onsite system's electricity generation is no longer considered green and you may not claim any energy and emissions benefits in direct connection to the onsite system.

Under specific type of sale known as REC arbitrage, system financing can be facilitated by selling the RECs that are associated with your onsite system and purchasing other RECs as replacements. This can be done to take advantage of price differentials of RECs, which may vary based on differences in resource type, geography, local market policies, and basic supply and demand dynamics. In this case, you have sold the RECs associated with your onsite system and therefore you cannot claim that your onsite system electricity generation is green. You may, however, claim the benefit of ***offsite*** green power associated with the replacement RECs you purchased.

Figure 2 – Example Data Entry Table for Onsite Renewable System



What onsite green power means for your performance metrics

The implications of onsite green power at your property depend on whether or not you own the RECs associated with your onsite renewable electric generation. If you own the RECs, then you will see the benefit of your green power in lower source energy, a better ENERGY STAR score, and a smaller greenhouse gas (GHG) emissions footprint. If you do not own the RECs associated with your onsite system (including if you have sold them through arbitrage), then the power generated by your onsite system is no longer considered green. This means your energy, GHG, and other metrics are computed as though you had purchased your energy from the local utility. The effect on these metrics is summarized in ***Figures 3 and 4***. If you sell your RECs through arbitrage, you can still claim benefits through offsite green power. That is, while your onsite system will no longer be green, you can enter the alternate RECs you purchase as offsite green power, as described in the following section.

Figure 3 – Performance Metrics When You Retain the RECs Associated with Your Onsite System

Metric	Effect	Explanation
Site Energy	No Effect	Renewable electricity is still a real energy requirement for the operation of your building.
Source Energy	✓ Improves	Onsite renewable energy is not subject to the same generation, transmission, and distribution losses as the grid.
Score	✓ Improves	The score is based on your source energy and will also improve.
Emissions	✓ Improves	Because you own the RECs, onsite renewable electricity is counted as zero emissions in your inventory.

Figure 4 – Performance Metrics When You Sell the RECs Associated with Your Onsite System (including through arbitrage)

Metric	Effect	Explanation
Site Energy	No Effect	Renewable electricity is still a real energy requirement for the operation of your building.
Source Energy	No Effect	Because you do not own the RECs, your electricity is considered to be equivalent to a grid purchase.
Score	No Effect	The score is based on source energy. Because your electricity is assigned the grid electricity source energy factor, your onsite system has no effect on score.
Emissions	No Effect	Because you do not own the RECs, you cannot claim a benefit in your emissions inventory.

UNDERSTANDING OFFSITE GREEN POWER

Offsite green power is a product you purchase from your local utility or third-party supplier. Often the supplier will bundle RECs with the underlying physical electricity into a single product. In this case, the actual electricity may be generated at a fossil fuel power plant in your area, while the RECs may be the environmental attributes of green power generated in another part of the country. Although the RECs were generated elsewhere, they are bundled to your electricity purchase, and therefore, you own the rights and can count the avoided emissions in your GHG reporting. The emissions benefit will be based on the location where your RECs were generated, not the location of your property.

In some cases, you may purchase your electricity from a local utility and purchase your RECs separately. This may happen in the case of REC arbitrage, where the REC you purchase is not specifically linked to an electric purchase (kWh). This may also occur if your organization makes a corporate purchase of RECs to cover electricity use across an entire portfolio of properties. Although these RECs are not bundled with electricity at the time of purchase, you can effectively "bundle" them in Portfolio Manager, by designating grid purchased electricity as green power and entering the appropriate REC information.

How to benchmark

An offsite green power purchase starts as a purchase of electricity from the grid, through your local or third-party supplier. Therefore, to benchmark offsite green power you will begin by entering an electric grid meter. All electric meters have an extra column in the meter consumption table, specific to green power, as shown in *Figure 5*. You will select the "Green Power?" column either if you have a bundled product from your utility or if you purchase RECs independently (through corporate purchases or arbitrage) and wish to link them to you grid purchase. Selecting the "Green Power?" checkbox for your electric meter will open an additional dialogue box (*Figure 6*) where you will answer a few questions about the source of your green power.

Figure 5 – Example Data Entry Table for Offsite Green Power

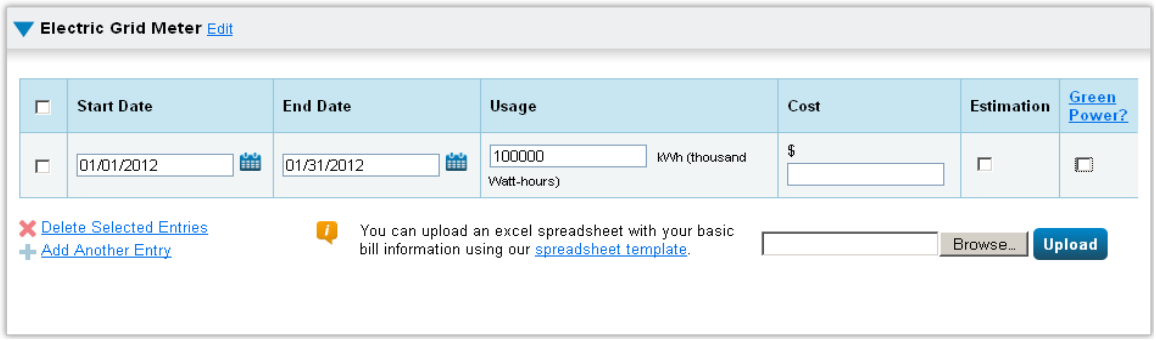
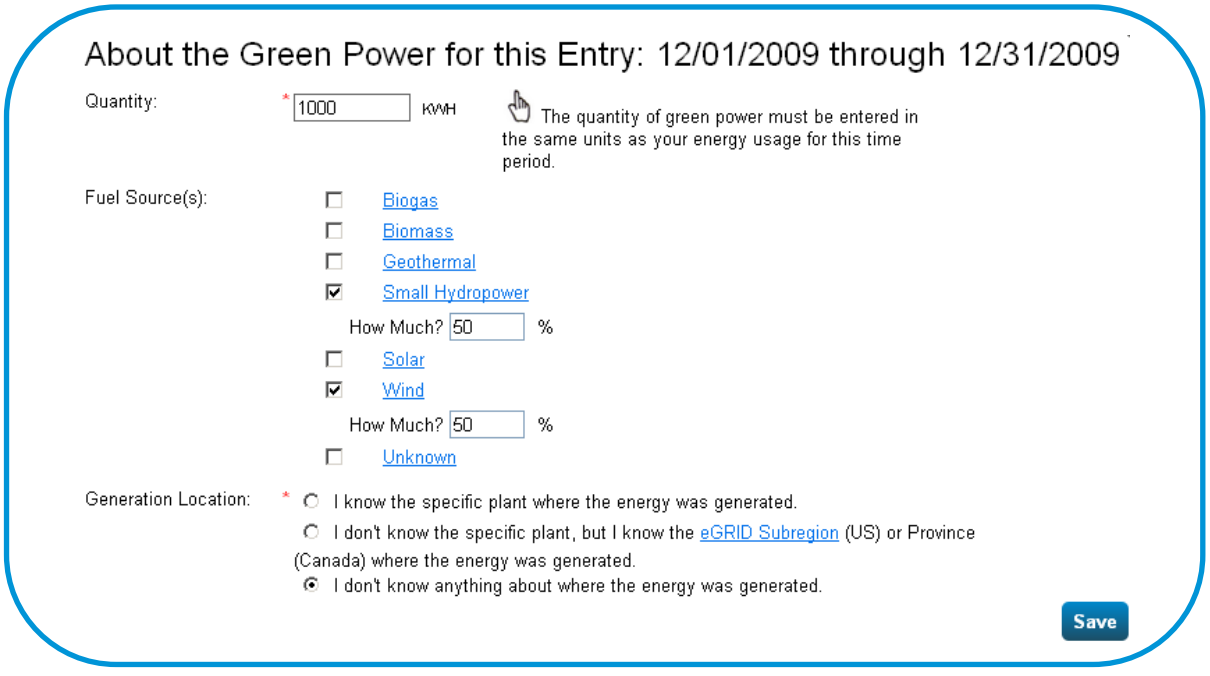


Figure 6 –Example Dialogue Box for Offsite Green Power Information



These questions collect the necessary information to compute the benefit of your green power:

- Quantity of Green Power. In many cases, your entire electricity bill may not be green power; you may have an agreement that specifies either a certain amount (kWh) or a certain percentage of your power as green. For accurate characterization of your emissions benefit, this amount is required.
- Fuel Source. Although the benefit of your emissions is based on the location where your power was generated, you can also enter the fuel source to provide greater specificity about your green power purchase. If you don't know the fuel source, you can leave this question blank or select "Unknown."
- Generation Location. You must indicate the location where your renewable energy was generated. If you know it, you can select a specific plant or region. The benefits of green power depend on where it is generated because this is where traditional electric generation is being replaced. That is, green power reduces the need for conventional methods of electric generation in the region where it was produced, which may differ from the location of your building. If you do know where your green power was generated, you can select "I don't know," which applies a default estimate based on the cleanest region of the grid. In this case, the factor with the smallest non-baseload emissions factor is applied, yielding the most conservative estimate of your benefit.

What offsite green power means for your performance metrics

The purchase of offsite green power is a GHG reduction strategy. When you purchase offsite green power, you purchase the rights to a zero-emissions energy supply. These purchases can be an important part of your overall GHG reductions strategy. With offsite green power you still purchase and receive your electricity from the local utility and your electricity is sourced from the national grid. Like any other building that receives its energy from the grid, you are assigned standard thermal conversion factors and the national source energy factor. For this reason the computation of your site energy and source energy are unchanged. These metrics quantify the real energy requirements of your building. The purchase of the RECs does not change the thermodynamic energy requirements of your building. The effect of your green power purchase is captured in your GHG emissions metrics, through your avoided emissions from green power and your net emissions. The metrics are summarized in *Figure 7*.

Figure 7 – Offsite Green Power and Your Performance Metrics

Metric	Effect	Explanation
Site Energy	No Effect	Renewable electricity is still a real energy requirement for the operation of your building.
Source Energy	No Effect	Although you have purchased green power, the actual electrons delivered to your building come from the main electric grid. Therefore, your source energy does not change.
Score	No Effect	The score is based on source energy. Because source energy is not affected by the purchase of green power, neither is your score.
Emissions	✓ Improves	The benefit of offsite green power accrues to your emissions inventory. Offsite green power enables you to track avoided emissions associated with your building.