

An Overview of Solar Photovoltaic Systems Characteristics

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Solar photovoltaic (PV) systems are a common topic of discussion around the real estate industry. Understanding how to value them and assist homeowners in making a buying decision is a skill that appraisers can learn. Understanding how they work and what financial benefits they offer the property owner is crucial to a credible valuation. What is your kilowatt hour cost? When asking that question to large groups of appraisers or real estate agents, I usually find very few with answers.

A four-hour class is devoted to training real estate professionals on how to analyze utility bills to establish the kilowatt per hour cost that would be offset by installing a solar PV system. That is the first step in valuing a solar PV system. Until you know how much it will save at a given location, it is impossible to develop a value unless you have lots of sales with similar size houses, with similar solar PV systems installed, and that are the same age. If you have that kind of data, you will be able to do a paired-data analysis. Most markets today have limited data and access to the solar sales features to make a direct comparison. The absence of sales data requires special skills to develop a credible opinion using recognized methods and techniques.

The following characteristics must be gathered from the property owner or installer before a value can be developed.

- Ownership status – Is it leased? A Power Purchase Agreement? Owned, but financed with a Uniform Commercial Code (UCC) Filing? Is it owned with no financing?

If the system is leased, a power purchase agreement, or owned but financed with a UCC filing, the system is personal property and not a fixture or part of the real estate. Don't forget to obtain the lease or power purchase agreement terms and analyze them to opine on the effect on the real estate value.

- Size of System – The size of each array or grouping of panels must be identified. Simply counting the panels will not give the system size because panels vary in wattage.
- Age of System – The age of the system is important because as the panels age, the energy production will decrease each year. The reduction is small, but it will affect the energy production over the life of the system.

- Manufacturer of the panels – Just like any other product, quality panels have higher production than lesser quality panels. Searching the website of the manufacturer or installation paperwork will give you the quality rating and loss factor.
- Tilt and Azimuth – Solar installers will survey the location of the solar system and try to install them for maximum production. That means the tilt or vertical angle of the panels and the Azimuth or compass direction the system faces are important factors in maximizing the efficiency of the system.
- Inverter type and size – The inverter converts the direct current (DC) produced into alternating current (AC) used by our buildings and the grid. Some systems have micro inverters on the back of each panel that operate that panel only while other systems have a central inverter that converts all energy produced from DC power to AC power.

It is important to know the size in wattage of the inverter(s), age, manufacturer, and warranty term. Most inverters will need to be replaced before the solar PV system warranty term. You'll need to consider replacing the inverter(s) within the cash flow analysis to valuing the system using the income approach.

- Mount type – Are they fixed or tracking? Do the panels stay in one position or do they move with the sun?
- Monitoring System – Is the system connected to a monitoring software that will provide production history, size, age, and graphics of each array? If so, this can be extremely valuable in collecting the characteristics identified here.

The best guide to gathering the details needed for valuing a solar system is the **Appraisal Institute's Residential or Commercial Green and Energy Efficient Addendum**. One page has the list of characteristics needed to develop a cost or income approach to valuing the system. These inputs make using a software, **PV Value®** or **Ei Value®**, much smoother. PV Value® is used in the Appraisal Institute's two-day course, "**Residential and Commercial Valuation of Solar.**" When sale of properties that are similar, compete for the same buyer, and have a similar size solar PV system are not available, appraisers must use other recognized methods and techniques. Using current installed cost less all forms of loss or depreciation is one simple way that should always be used with another method. The income approach is another recognized method that can be used when sales data are insufficient. The PV Value® software is a discounted cash flow that is user friendly; however, if you do not understand the method, it is not for you.

Solar PV valuation is a complex appraisal assignment. This article addresses only the very entry level topic of gathering the accurate characteristics of the system and how it is installed. Grow your business by taking a class to hone your skills on valuing these systems. Most appraisers find it takes more than a 4-hour class to learn the basics of valuing solar PV. You'll find a **Field Guide to Solar Energy** on my website that will list resources useful to real estate professionals.

Sandra K Adomatis, SRA, LEED Green Associate, GREEN, is a national speaker on valuing high performance features. Her background as an active real estate appraiser, REALTOR, instructor, and course developer brings insightful dialogue to share with builders, lenders, and real estate professionals. You might even say she wrote the book because she did author, "[Residential Green Valuation Tools](#)." She spearheaded the "Appraisal Institute Residential Green and Energy Efficient Addendum" that is being used by builders, appraisers, and energy organizations around the country.

She shares her knowledge of the high-performance features hoping to move the market to a higher performing place where homeowners will live a safer, healthier, and at lower cost. Sandra shares resources on her website, www.adomatisappraisalservice.com.