


Illinois Sun & Solar Photovoltaic Systems



Presented by Sandra K. Adomatis, SRA
E-Mail: adomatis@hotmail.com

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- SRA, LEED Green Assoc., GREEN
- Author of "Residential Green Valuation Tools"
- Developer of two Appraisals Courses on Solar PV for Appraisal Institute
- National Speaker

Sandra K. Adomatis, SRA,
LEED Green Assoc., GREEN
CEO @ Adomatis Appraisal Service

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Did you know Illinois ranks 17 in solar installs for 2020?




<https://www.seia.org/research-resources/solar-market-insight-report-2020-year-review>

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Houses with solar photovoltaic systems are complex.

Polycrystalline Panel



Know the type of Panel and the wattage of each panel in each array.

An Array is a grouping of panels



How many directions can solar face on this roof?

Houses with unusual roof lines and solar present a setting for multiple arrays and complex energy production estimates.

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Why are homes with a solar PV such a problem for appraisers?

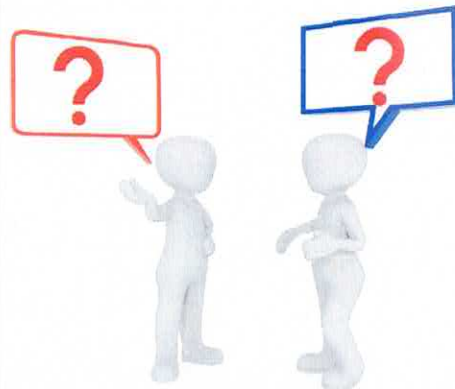
- Inadequate knowledge on behalf of the real estate professionals in general
 - Real estate agents
 - Lenders
 - Appraisers
- Limited solar PV data available
 - Homeowners do not know the size of the system, year installed, etc.
- Appraisal fees do not cover the time and skill required to value solar
- Limited sales data to support value from the market

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The kilowatt hour rate at the property is extremely important.

Analyzing utility costs may be a new concept to appraisers, agents, & lenders.

Homeowners do not understand why it is important to provide utility bills and system characteristics.




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Monitored Systems offer good details of the production.

Multiple Arrays Complicates the Analysis

Month	Energy produced
January 2018	558 kWh
February 2018	674 kWh
March 2018	910 kWh
April 2018	1,086 kWh
May 2018	942 kWh
June 2018	1,214 kWh
July 2018	1,146 kWh
August 2018	1,095 kWh
September 2018	890 kWh
October 2018	786 kWh
November 2018	632 kWh
December 2018	544 kWh
Total	10,487 kWh



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The monitoring system provides energy production history

This report provides up to five years energy production ending with the year 2019.

Month	2015	2016	2017	2018	2019
January	579 kWh	556 kWh	518 kWh	568 kWh	568 kWh
February	703 kWh	794 kWh	559 kWh	674 kWh	599 kWh
March	997 kWh	989 kWh	994 kWh	910 kWh	888 kWh
April	1,119 kWh	1,072 kWh	1,162 kWh	1,086 kWh	1,033 kWh
May	996 kWh	946 kWh	1,009 kWh	942 kWh	972 kWh
June	1,694 kWh	1,120 kWh	1,146 kWh	1,214 kWh	888 kWh
July	1,107 kWh	1,178 kWh	1,154 kWh	1,146 kWh	275 kWh
August	1,159 kWh	1,164 kWh	1,051 kWh	1,095 kWh	
September	968 kWh	940 kWh	858 kWh	890 kWh	
October	721 kWh	763 kWh	741 kWh	786 kWh	
November	652 kWh	617 kWh	528 kWh	632 kWh	
December	583 kWh	490 kWh	595 kWh	544 kWh	
Total	10,678 kWh	10,630 kWh	10,323 kWh	10,487 kWh	5,222 kWh

Full System

Devices

Envoy 121311022358

35 Microinverters



Do the math and tell me how much this property owner saved by having a solar PV system in 2018?

Assume - \$0.23 kWh rate

Answer:
 $10,487 \text{ kWh} \times \$0.23 \text{ kWh} = \$2,412.01$

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The Lack of Evidence is NOT Evidence!



Evidence for market reaction may be found in the aerial photograph but too new to provide sales data.

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If there are no sales of houses with solar, how are buyers making their buying decisions?



- Installed Cost
- Savings identified by solar sales team – income approach
- They just want to save the planet?

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Support the kilowatt hour cost

Energy Usage Comparison

	This Month May 4, 2018	Last Month Apr 4, 2018	Last Year May 3, 2017	
Service to kWh Used	0	0	1323	Analyze 6 months to one year of bills to establish a credible kWh charge at the location.
Service days	30	30	29	
kWh/day	0	0	46	
Amount	\$8.70	\$8.70	\$147.94	

Month	Invoice	Customer Charge	kWh	\$/kWh
Mar-18	\$116.45	\$17.00	911	\$0.11
Apr-18	\$114.07	\$17.00	886	\$0.11
May-18	\$117.13	\$17.00	918	\$0.11
Jun-18	\$156.89	\$17.00	1443	\$0.10
Jul-18	\$180.71	\$17.00	1673	\$0.10
Aug-18	\$205.51	\$17.00	1974	\$0.10
Sep-18	\$188.67	\$17.00	1904	\$0.09
Oct-18	\$154.45	\$17.00	1463	\$0.09
Nov-18	\$127.52	\$17.00	1110	\$0.10
Dec-18	\$127.26	\$17.00	1124	\$0.10
Jan-19	\$164.58	\$17.00	1498	\$0.10
Feb-19	\$128.73	\$17.00	1063	\$0.11
Mar-19	\$113.88	\$17.00	880	\$0.11
Average	\$145.83	\$17.00	1296	\$0.10

The utility bill comparison above was given to me by a homeowner. How would you like to have your utility bill reduced to the flat rate charge? Does this have value?

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Best Resource For Gathering Solar PV Characteristics-Pearl Provides

Residential Green and Energy Efficient Addendum

Client: _____ Appraisal File #: _____

Subject Property: _____

City: _____ State: _____ Zip: _____

Additional resources to aid in the valuation of green properties and the completion of this form can be found at http://www.appraisalinstitute.org/education/green_energy_addendum.aspx

The Appraisal Institute's Residential Green and Energy Efficient Addendum (AIRGEEA) is the best resource an appraiser can use to gather the pertinent information on a solar PV system.

The data flows into the PV Value® or EI Value® software cutting down your time and increasing your accuracy of the system characteristics.

http://www.appraisalinstitute.org/education/green_energy_addendum.aspx

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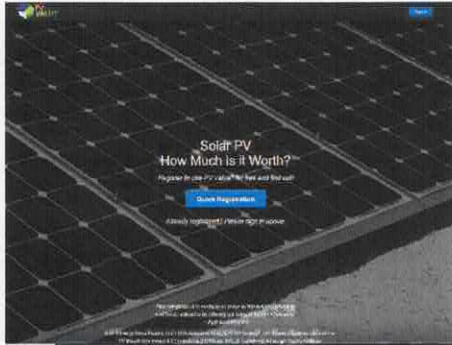
Solar Photovoltaic (Electric) System		
	Array #1	Array #2 (if applicable)
Type of Ownership	<input type="checkbox"/> Leased <input type="checkbox"/> Owned <input type="checkbox"/> * Solar Loan with UCC Filing <input type="checkbox"/> Power Purchase Agreement (PPA) If solar loan has UCC Filing, it is considered personal property and should not be included in market value.	<input type="checkbox"/> Leased <input type="checkbox"/> Owned <input type="checkbox"/> Solar Loan <input type="checkbox"/> UCC Filing <input type="checkbox"/> Power Purchase Agreement (PPA)
Panel Specifications	System Size: _____ kW (1kW = 1000 Watts) Age of Panels: _____ years Energy Production: _____ kWh Source of Energy Production Estimate: _____ Manufacturer: _____ Warranty on Panels: _____ years	System Size: _____ kW (1kW = 1000 Watts) Age of Panels: _____ years Energy Production: _____ kWh Source of Energy Production Estimate: _____ Manufacturer: _____ Warranty on Panels: _____ years
Array Placement Affects energy production. *Orientation	Location (roof, ground, etc.): _____ <input type="checkbox"/> Fixed Mount <input type="checkbox"/> Tracking Mount Tilt / Slope: _____ *Azimuth: _____	Location (roof, ground, etc.): _____ Tilt / Slope: _____ Azimuth: _____ Orientation (direction panels face): _____
Inverter Specifications	Number of Inverters per Array: _____ Age: _____ years Wattage: _____ watts Manufacturer: _____ Warranty Term: _____ years	Number of Inverters per Array: _____ Age: _____ years Wattage: _____ watts Manufacturer: _____ Warranty Term: _____ years
Energy Storing Batteries	Battery Type: <input type="checkbox"/> Lithium-ion <input type="checkbox"/> Lithium-ion Polymer <input type="checkbox"/> Lead Acid <input type="checkbox"/> Lead Calcium <input type="checkbox"/> AGM <input type="checkbox"/> GEL Manufacturer: _____ Storage Capacity: _____ kWh Warranty Term: _____ years Battery age: _____	
Name of Utility Company:	Charge / kWh from Utility	\$ _____ / kWh

http://www.appraisalinstitute.org/education/green_energy_addendum.aspx

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Free Software to apply an income and cost approach to solar PV.

PV Value



<https://www.pvvalue.com/>

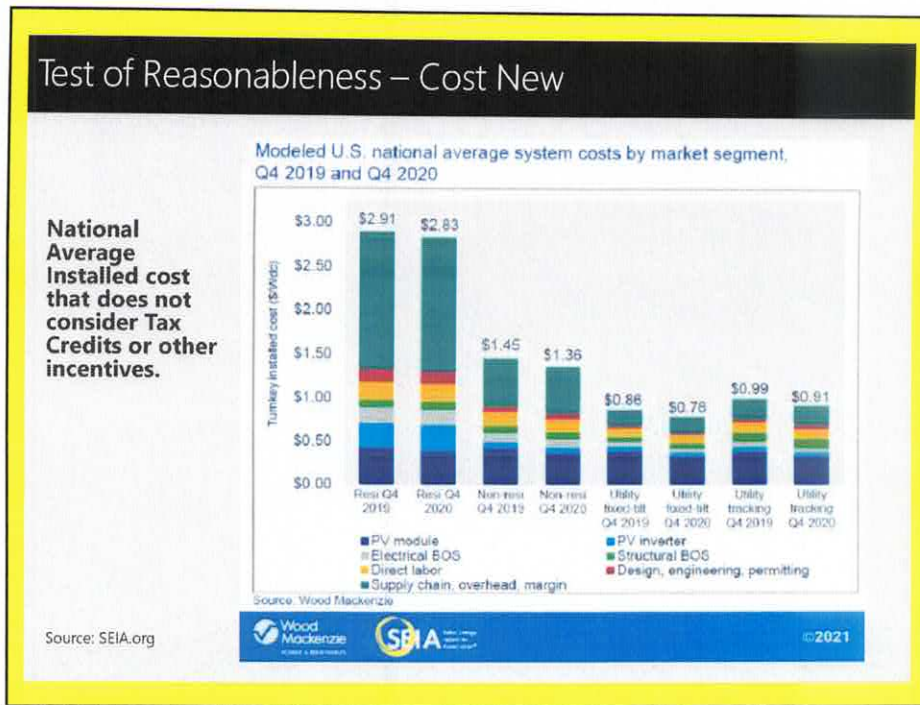
Caution

Understand discounted cash flow.

Do **NOT** use defaults for the inputs.

Explain the input sources to allow the client to understand how you arrived at the conclusions.

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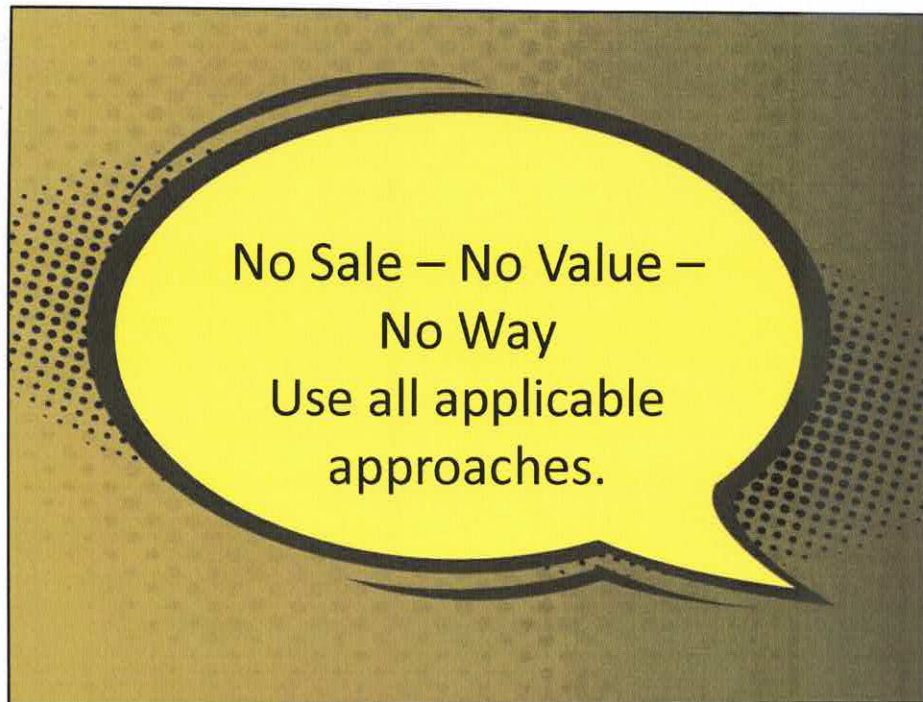
Paired Data Analysis

Paired Data Shows % Premium for Pearl Gold Certified Home with 10.32 kW Solar System Phoenix, AZ

Address	Goodyear, AZ 85338	Goodyear, AZ 85336	Goodyear, AZ 85328	Goodyear, AZ 85338	Goodyear, AZ 85333
Features		Adjustment	Adjustment	Adjustment	Adjustment
MCS/In 10/Source	40	38	19	30	10
Days on Market	5174/2219	4/2/2020	4/7/2020	1/21/2020	9/9/2020
Date of Sale	\$294,500	\$260,000	\$265,000	\$260,000	\$241,000
Sale Price	Buyer/Assessed Loan	50	55,000	50	30
Concessions	\$150,350	\$193,34	\$152,38	\$163,00	\$155,56
\$/SF of Living Area	1,739	1,734	1,734	1,571	1,380
\$/SF of Living Area	8,496	7,043	7,404	3,500	7,153
Sat. Sale (Y/N)	View/Location	Residential	Close to Park	Powerline	BackYard
View/Location	Single Family Home	Single Family Home	Single Family Home	Single Family Home	Single Family Home
House Style	1	2	1	1	1
Number of Stories	3 Years	8 Years	7 Years	7 Years	7 Years
Actual Age (Yr)	V Good Upgrades	Good Upgrades	V Good Upgrades	V Good Upgrades	Average Upgrades
Condition	472	472	472	472	472
Beds/Bath Count	Solar Panels: 10.32 kW	Leased Solar	None	Leased Solar	None
Energy/Panels/Features	Central Electric	Central Electric	Central Electric	Central Electric	Central Electric
Notes/Ac/Conditioning	2-car Garage	2-car Garage	2-car Garage	2-car Garage	2-car Garage
Garage #/Car	Cov. Patio/ Priv. Pool	Cov. Patio	Cov. Patio	Cov. Patio/ Priv. Pool	Cov. Patio/ Priv. Pool
Pool/Spa/HotTub/2	None	None	None	None	None
Qualification	\$260,000	\$265,000	\$265,000	\$260,000	\$241,000
Lot Price	None	None	None	None	None
Days on Market	Adjusted Sale Price	\$295,000	\$295,000	\$295,000	\$295,000
Days on Market		28%	21%	20%	20%
Days on Market		Sale Price Premium \$29,500	Sale Price Premium \$29,500	Sale Price Premium \$29,400	Sale Price Premium \$30,200

Test of Reasonableness
 10.32 kW system new - \$2.95 to \$3.00 watt
 Cost New in 2018-2019 - \$3.00 watt

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Proving Market Reaction

- Proving market reaction is all about support that the market accepts the features.
- How many MLS active listings, expired listings, pending listings, sales advertise solar PV?
- Can you search building permits for solar installs?
- Review aerial to identify solar in the area.

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Ownership is important and an appraiser liability issue if not correct.

	Array #1
Type of Ownership	<input type="checkbox"/> Leased <input type="checkbox"/> Owned <input type="checkbox"/> * Solar Loan with UCC Filing <input type="checkbox"/> Power Purchase Agreement (PPA)
	If solar loan has UCC Filing, it is considered personal property and should not be included in market value.

http://www.appraisalinstitute.org/education/green_energy_addendum.aspx

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Leased, Power Purchase Agreement, or Owned & Financed with Solar Loan/UCC

- **Owned but financed with a solar loan** that has a Uniform Commercial Code (UCC filing). The UCC identifies it as personal property. The loan document identifies it as personal property and states you cannot mortgage over it. Do not include in real property value for mortgage lending purposes.
- **Property Assessed Clean Energy (PACE)**- A financing instrument that pays back the loan through a "non-advalorem" assessment on real estate tax bill. The loan is assumable, takes first lien position, has no firewall to protect homeowner from over mortgaging the property, and may not be at an interest rate as low or lower than mortgage rates.

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Property Assessed Clean Energy – PACE Liens that financed solar PV

A PACE loan is paid back through the real estate taxes and runs with the real estate.

It has first lien position in the event of a foreclosure.

PACE or HERO or ILPACE are identified on the real estate tax bill under Non-Ad Valorem Payments. Seller can pay off the loan at time of closing.

Appraiser should research the payoff amount by contacting the Clerk's Office. This applies to the subject and any comparables used that have a PACE loan.

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Illinois Residential PACE Program

POLICY COMPONENTS QUESTIONS

1. Does the state have PACE enabling legislation?
2. Is a PACE program in development or was a PACE program developed?
3. Do active programs exist in the state?
4. Does the program allow both efficiency and renewable energy measures to qualify for financing?
5. Is the PACE financing collected and enforced in the same manner as other taxes and special assessments?

<https://spotforcleanenergy.org/state/illinois/residential-property-assessed-clean-energy/>

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State PACE Programs		
State	Residential PACE Program in place?	Source
Illinois	Yes	https://spotforcleanenergy.org/state/illinois/residential-property-assessed-clean-energy/
Indiana	Not yet!	https://spotforcleanenergy.org/state/indiana/residential-property-assessed-clean-energy/
Minnesota	Yes	https://spotforcleanenergy.org/state/minnesota/residential-property-assessed-clean-energy/
Missouri	Yes	https://energy.mo.gov/assistance-programs/property-assessed-clean-energy/residential-pace-faqs
Wisconsin	No	https://www.pacewi.org/what-is-pace.html

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Homeowners contribute to the data challenge

- They hold the key to the solar characteristics.**
- They do NOT know ownership rights for solar.**
- They often do not read the contract they signed.**
- They refuse to provide the electric bills.**

No wonder there is no value

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Real Estate Agents – rely on homeowner

- **No listing data- incorrect data entry**
- **No contract- no docs in MLS**
- **No electric bills**
- **No system description**
- **NO AI Residential Green & Energy Eff. Addendum**

No wonder there is no value

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Actual Listing Comments

"Solar Water Heater"

"Solar Pool Cover"

"Solar Pool"

"Low electric bill- No Solar Needed"

"Wow- Solar"

"Leased Solar" (all systems in leased category)

No wonder there is no value

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Web Searches for Home Listed with the Word "Solar"

State	Zillow	Realtor.com
Illinois	322	191
Missouri	60	95
Indiana	20	26
Wisconsin	36	91

The search included homes for sale only. How many may have been sold with solar? How many expired?

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Lenders – No help here either.

- No contract info**
- No fee or turn time increase**
- Low fee- low quality appraisal**
- No understanding of the solar valuation process**
- No qualification for appraiser competency**

No wonder there is no value

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Appraiser Challenges

No support for the magic \$5000 adjustment

No value- solar is personal property

No research- What is a UCC filing? Loan, PPA, Lease, Owned?

No time- withdraw from assignment

No education or competency

No appraisal fee to cover the added time to provide support.

No wonder there is no value

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Peer Feedback- Competency

" I describe if the roof is damaged and move on"

"Lender told me no adjustments at all for solar"

"I do what you tell me."

"What is a PACE?"

"What's a UCC filing?"

"Do I really need to do all that work?"

"Solar classes are a waste of time"

No wonder there is no value

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Solar Installers add to the data challenge

No contract for appraiser- third party

No time to answer questions

No return phone call

No database to provide to appraiser

No wonder there is no value

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No Data- No Proof

No cooperation from:

Homeowner Listing Agent

Lender Appraiser

Installers Construction Office

No wonder there is no value!

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HOME ASSET DETAILS
Photovoltaic System
 Certified on March 21, 2018
 Pearl Solar Certification Report

Panel Specifications

Type of Ownership	Shared
Utility Name	GreenSource
Utility Rate	\$ 114.000

Panel Specifications

System Size (kWp)	7.04
Age of Panels (Years)	0
Energy Production Estimate (kWh)	14653
Source of Energy Production Estimate	Analysis
Manufacturer	Truesolar
Warranty on Panels (Years)	25
Offered by	Sunpower
Location	Roof
Mount	Fixed Mount
Efficiency Rating	23%
Manufacturer Years in Business	35

Your solar array is made up of one or more solar panels, which absorb the sun's energy and transform it into electrical energy. Your inverter transforms the direct current (DC) power generated by the panel into alternating current (AC) power that you can use in your home. Your panel's efficiency rating indicates the percentage of the sun's energy falling on your panels that is converted into usable electric energy under specified conditions. The higher your panel's efficiency rating, the more effective they are at converting sunlight into energy.

Panel efficiency ratings have been increasing due to technological innovation. Most panels have efficiencies in the 12% to 18% range, although top performing panels may have an efficiency above 20%. Does that mean a high efficiency panel may not be the right solution for all homeowners? A home with a large available roof space may be able to obtain all the solar energy it needs from a large number of lower efficiency panels.

Industry Average Efficiency Rating

0 Years Poor | 2 | 4 | 6 | 8 | 10 Years Excellent

12% On Lower | 15% | 17% | 19% | 21% | 23% Excellent

Inverter Specifications

Number of Inverters Per Array	1
Age (Years)	0
Voltage	1600
Inverter Manufacturer	Solar Edge
Warranty Term (Years)	25
Offered by	Solar Edge

The inverter is less visible than the solar panels, but it's just as important. The inverter converts the electricity generated by the panels from direct current (DC) to alternating current (AC), allowing it to be used in the home. Inverters typically have a shorter life than panels. The length of warranty is one indication of its quality. Manufacturers typically offer five to ten year warranties on inverters, although some offer longer warranties of up to twenty five years.

Inverter Warranty

0 Years Poor | 2 | 4 | 6 | 8 | 10 Years Excellent

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HOME ASSET DETAILS
Photovoltaic System
 Certified on March 21, 2018
 Pearl Solar Certification Report

Installation Warranty

Years in Business	30
Publicly Traded	Yes
NABCEP Certified	Yes
Installation Warranty (Years)	10
Offered by	Green Convergence

The quality of the work used to install solar panels on the roof is an important and often overlooked feature of a home's PV system. A poor installation job can damage the roof or even result in loss or damage to the solar panels. High quality installers stand behind their installation with a warranty. A 10 year warranty is generally a good one and indicates that the installer has confidence in the quality of their work.

Installation Warranty

0 Years Fair | 2 | 4 | 6 | 8 | 10 Years Excellent

Power Production Warranty

Warranty Length (Years)	25
Power at End of Warranty	87%
Annual Degradation Factor	0.3%

SUNPOWER

All solar panels have a manufacturer which states how much power they will produce under ideal conditions. The aging of a panel's materials does not occur evenly over time, but even after decades they should still be generating electricity. The Power Production warranty is the manufacturer's guarantee that the panels will produce at least a specified amount of power each year. The warranty has two components: the Degradation Factor and the Power at End of Panel's Life.

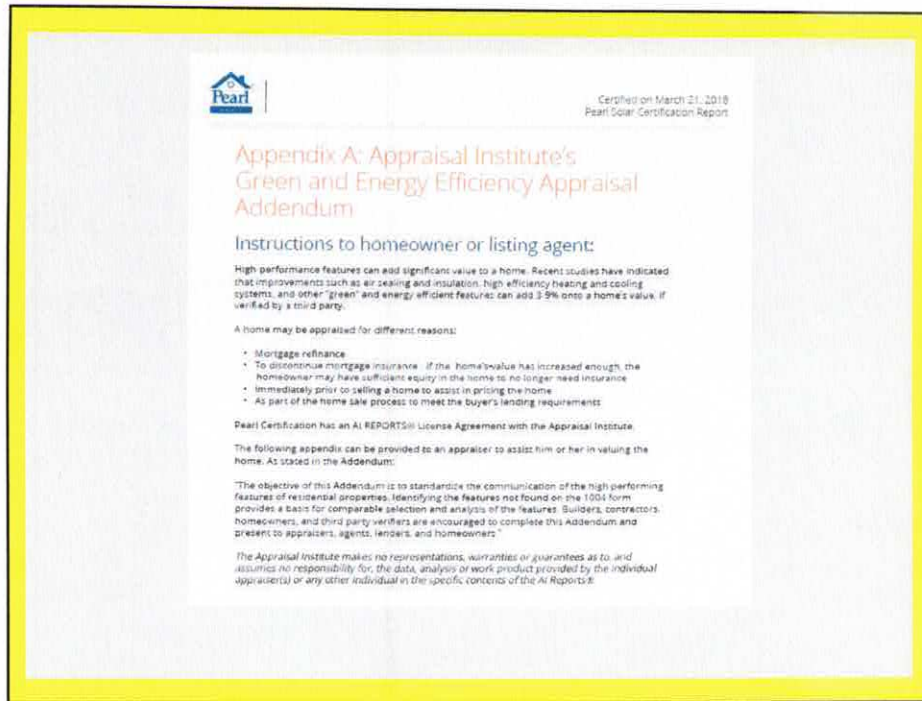
The Degradation Factor guarantees that the performance of the panels will not decline by more than a specific amount (typically less than 1%) in any given year.

The power at the end of a panel's guarantee period is guaranteed to be at least a certain percentage of the original power, typically between 70% and 90%, after a 25 or 30 year period.

Power Production at the End of Warranty

0 Years Fair | 2 | 4 | 6 | 8 | 10 Years Excellent

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Take Appraisal Institute Courses and pass the exams to be on the Green Registry

Valuation of Sustainable Buildings

Title	Hours	State Approval
Introduction to Green Buildings	8	State Approval
Case Studies in Appraising Green Residential Buildings	8	State Approval
Residential and Commercial Valuation of Solar	15	State Approval
Case Studies in Appraising Green Commercial Buildings	15	State Approval
Practical Applications in Appraising Green Commercial Properties	15	State Approval

FAQs
[Program Registry – Residential](#)
[Program Registry – Commercial](#)

<https://www.appraisalinstitute.org/education/your-career/professional-development-programs/>

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Now it is your turn to ask questions?



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Contact Information

Sandra K. Adomatis, adomatis@hotmail.com

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