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How PV System Ownership Can Impact the Market Value of Residential Homes

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Abstract

There are multiple ways for a homeowner to obtain the electricity generating and savings benefits offered by a photovoltaic (PV) system. These include purchasing a PV system through various financing mechanisms, or by leasing the PV system from a third party with multiple options that may include purchase, lease renewal or PV system removal. The different ownership options available to homeowners presents a challenge to appraisal and real estate professionals during a home sale or refinance in terms of how to develop a value that is reflective of the PV system's operational characteristics, local market conditions, and lender and underwriter requirements. This paper presents these many PV system ownership options with a discussion of what considerations an appraiser must make when developing the contributory value of a PV system to a residential property.

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We summarize in this report how different ownership options of a residential photovoltaic (PV) system will have the potential to impact the "market value" and "Fair Market Value" (FMV) of that PV system. These values, typically developed by an appraiser, may result in an impact to the equity value of the home, which can vary depending on who owns the PV system at the time of the real property transaction. First, this paper compares the "estimated" value of a hypothetical PV system, looking at one owned outright, financed through a conventional mortgage and financed though a Property Assessed Clean Energy (PACE) Assessment. Results suggest that the PV system owned outright and financed through a conventional mortgage would have a positive impact to the property equity, while the PACE system may have a negative equity impact early on during the transaction process, though turning positive as the Assessment balance is reduced.

Third-party owned PV systems are also analyzed at different points in the transaction process for potential impacts to the home's equity value during a home sale, home refinance, lease or Power Purchase Agreement (PPA) buyout, and end of lease or PPA term. Underwriting guidelines do not yet exist for third-party owned systems during the transaction process and this paper presents a discussion on appraiser considerations in light of whether underwriting is required for that property; whether the mortgage balance for the home is still owed, or paid off may present different options to the appraiser when considering value for these third-party owned PV systems. This discussion is likely to change once underwriting guidelines are available for third-party owned systems. As some third-party owned PV systems have the potential to transfer ownership at different times to the homeowner, this paper also presents a discussion of FMV and the role of the appraiser in developing that value.

To better understand the value proposition of these different ownership options, more guidance from underwriters is necessary to help address the questions appraisers will have when encountering third-party owned PV systems and Renewable Energy Credits (RECs) for both customer owned and third-party owned PV systems. Appraisers also need guidance on how to develop the FMV of a PV system that transfers ownership from the third-party to the homeowner. Research on home transactions with third-party owned PV systems compared to customer owned PV systems will help appraisers better understand the market value proposition for existing homes absent underwriter guidance, and developing a standardized, national database of all installed PV systems with detailed system characteristics as well as the ownership structure can help appraisers develop more accurate estimates of both market value and FMV. Addressing these areas will facilitate the transaction process for homes with PV systems and reduce the uncertainty for appraisers developing both market value and FMV for PV systems on residential properties.

NOMENCLATURE

AI	Appraisal Institute
c	cent
CAGR	Compound Annual Growth Rate
DOE	Department of Energy
EIA	Energy Information Agency
FASB	Financial Accounting Standards Board
FHFA	Federal Housing Financing Agency
FMV	Fair Market Value
HUD	Department of Housing and Urban Development
IASB	International Accounting Standards Board
ITC	Investment Tax Credit
kW	kilowatt
kWh	kilowatt hour
LBNL	Lawrence Berkeley National Laboratory
LTV	loan-to-value
NREL	National Renewable Energy Laboratory
PACE	Property Assessed Clean Energy
PPA	Power Purchase Agreement
PBI	Production Based Incentive
PV	photovoltaic
REC	Renewable Energy Credit
RESO	Real Estate Standards Organization
SEIA	Solar Energy Industry Association
SEPA	Solar Electric Power Association
SNL	Sandia National Laboratories
W	watt
yr	year

INTRODUCTION

This paper seeks to provide clarity regarding how different solar photovoltaic (PV) ownership structures potentially impact the "market value" or "Fair Market Value" of a PV system on a residential property.[1] How these values are determined has been identified as a market barrier by the solar industry (Margolis and Zuboy, 2006), and is a topic of great interest to the appraisal, lending and real estate industries. The intended audience of this paper is for appraisers, lenders, real estate agents, and underwriters; however homeowners and the solar industry can benefit from this work as value considerations have the potential to influence decisions made by solar PV customers. A general outline of the different ownership options that will be presented in this paper is shown in Table 1.

At the time of this publication, a potential residential PV customer can choose from the following ownership options, which include the ability to:

- Own the PV system outright with a cash purchase or some type of financing (Property Assessed Clean Energy (PACE) financing, refinance, unsecured loan, on-bill financing), and
- Have a third-party own and maintain a customer-sited PV system through with a no-money-down lease, pre-paid lease or power purchase agreement (PPA) with the potential to purchase the system, remove it at the end of the lease or lease a new PV system.

Other ownership options that are not attached to the homeowner's real property include:

- Owning or purchasing a share in a PV system through a community ownership or share model (IREC, 2010; NREL, 2012), or
- Investing in a large PV system with other investors (or homeowners) either locally or through solar crowdfunding/sourcing platforms.[2]

The community and crowdfunded/sourced options have limited availability to most residential homeowners though are briefly introduced here to point out that the benefits of solar PV are not only restricted to homeowners. These models may become more popular over time and allow renters the benefits of shared ownership of a PV system through an investment or reduction in their utility bill. This paper will not focus on these options, though the reader is encouraged to take a look at IREC (2010) and NREL (2012), the information in reference 2 as well as a paper by the Solar Electric Power Association (SEPA) (Taylor and Clamp, 2012) which looks at the "Changing Ownership of Distributed Photovoltaics" through a discussion on both the advantages and challenges of customer owned, solar industry owned (lease or PPA) and utility owned PV systems.

[1] It is important to note that this paper does not directly compare and contrast the relative benefits and pros/cons of each ownership structure outside of the discussion on market value. For those interested in further research, a paper by Speer (2012) provides information available on different ownership and financing options.

[2] Summer 2013 discussion on crowdfunding solar. http://www.pv-tech.org/editors_blog/solar_crowdfunding_pushes_way_beyond_the_social_network

Distributed PV systems installed on residential properties to date only represent a small fraction (<1%) of all potentially available rooftops in the U.S. This low adoption rate has made it difficult for real property appraisers to develop an opinion of value using traditional comparable "paired sales" techniques when a home is sold or refinanced with PV. Methods for valuing PV systems using standard appraisal practices include income, cost and paired sales, which are developed by the appraiser to reflect the local market conditions, and to what degree the PV system contributes to the value of real property. Because PV systems are just beginning to be encountered by appraisers, efforts are underway by the Appraisal Institute (AI) through their Residential and Commercial Valuation of Solar course[3] to ensure that when a house with PV is sold or refinanced, or ownership of the PV system is transferred, the appraiser has been educated on how to properly value the PV system. Studies have revealed that PV systems do sell for a premium and add value to homes, in most cases, though these studies are limited in their geographic scope and have not yet included third-party owned systems (Hoen et al., 2011; Hoen et al., 2013; Colorado Energy Office, 2013).

There has been a lot of research and discussion around the value of solar to all stakeholders; including the customer, solar industry and the utility,[4] and these discussions can help the appraiser better understand local market conditions and general solar industry trends. This paper will focus first on the "market value" developed by an appraiser for valuing the PV system owned by the homeowner during a sale or refinance. By developing and recognizing the market value, the home equity value increases and can be unlocked by the homeowner, which can be a factor in the type of loan product that is used (Becker-Birck et al., 2013). Cost does not necessarily equate to value, especially as PV in some markets is only desirable with the current crop of rebates, tax credits and renewable energy credits, which make it difficult for an appraiser to use the cost approach. Ultimately, the appraiser will develop the contributory value of a PV system with an understanding of what the market will support and the data they have to work with.

There is another type of market value that this paper will discuss, and involves the transfer of the PV system to a homeowner at a defined point during the term of the lease. The "Fair Market Value" (FMV) determination is an IRS requirement that requires an independent appraiser develop the value of the leased equipment that will be transferred to the homeowner. This is due to taxable benefits realized by the leasing company, such as currently available through depreciation and any treasury grants. Due to the different values that may apply to the PV system at different stages of ownership, the FMV may be entirely different, or in some cases, the same as the market value. As the conclusion of value by an appraiser may utilize similar sources to develop the FMV, differences can arise based on which party will benefit from the PV system at that point in time (homeowner if purchased, or leasing company if re-sold on the market or recycled). Understanding differences between market value and FMV will help appraisers understand what types of values may be developed for third-party owned PV systems at different stages in ownership.

[3] Course details listed here: http://www.appraisalinstitute.org/education/course_descrb/Default.aspx?prgrm_nbr=844&key_type=C

[4] Many papers have been written about the "value" of solar from a rate-making perspective for developing utility or state-based incentive programs that include rebates and/or net metering, or the "financial value" based on the energy saved and income from REC payments. Certain aspects of these different "values" will be utilized by the appraiser to develop an opinion of market value, though do not stand alone as a "market value."

Table 1. Different PV ownership options discussed in this paper – Potential impact to the home's market value

Ownership Option	Potential Market Value Impact of PV System		
	Will it add value?	**Appraiser Considerations**	**Other Considerations**
Owned outright (no outstanding obligations)	In most cases	• Appraiser must be knowledgeable about PV systems, proper valuation techniques and what the market will support	• Condition, shading, obsolescence and potential aesthetics
Owned with secured loan	In most cases	• Appraiser must be knowledgeable about PV systems, proper valuation techniques and what the market will support	• Condition, shading, obsolescence and potential aesthetics • Market value (and impact to home equity value) would not be different than owned outright, though value to homeowner would be less as loan repayment is required during a refinance or home sale
Owned with conventional mortgage	In most cases	• Appraiser must be knowledgeable about PV systems, proper valuation techniques and what the market will support	• Condition, shading, obsolescence and potential aesthetics • Market value (and impact to home equity value) would not be different than owned outright, though net equity value to homeowner may be less if the principal balance owed is greater than the value of the PV system
PACE Assessment	In most cases	• Appraiser must be knowledgeable about PV systems, proper valuation techniques and what the market will support • Appraiser will consider the Assessment whether there is a seller concession that is necessary to get the buyer to assume the remaining payments, or whether seller pays off the lien during the home sale	• Condition, shading, obsolescence and potential aesthetics • Market value (and impact to home equity value) may be less if buyer assumes the assessment. It may be a dollar-for-dollar adjustment based on the amount of the assessment remaining or something less, depending on market data • Some of the earliest PACE Assessments may be required to be paid off as part of a refinance
Third-party owned PV system – transfer lease *or* buyout lease during home sale or refinance	See Discussion in Table 3	• Fair Market Value appraisal may or may not be required – See lease agreement for more detail • Appraiser must be knowledgeable about PV systems, proper valuation techniques and what the market will support • Appraiser must know the PV system is not owned by homeowner and review a copy of the lease to understand its terms • Appraiser must understand underwriter requirements for asset recovery in foreclosure, if applicable	• Condition, shading, obsolescence and potential aesthetics • The property may be more attractive to a potential buyer, though the lease may or may not be transferrable, depending on buyer's credit and willingness to take the lease obligation • Seller may be required to purchase PV system from leasing company (see box below)

Third-party owned PV system – break contract & purchase lease before home sale	See Discussion in Table 3	• Fair Market Value appraisal may or may not be required – See lease agreement for more detail • Appraiser must be knowledgeable about PV systems, proper valuation techniques, lease terms, and what the market will support • This is not the same as the potential fair market value appraisal that may be necessary when determining the buyout amount. The market value would be determined later by the appraiser when the PV system changes hands	• Condition, shading, obsolescence and potential aesthetics • Early buyout penalties may apply which upon payment by homeowner, may or may not be greater than the potential market value developed by the appraiser as part of the home sale • The homeowner may try to price the home to recover the buyout costs

1. DIRECT OWNERSHIP OF PV SYSTEM

Direct ownership refers to PV systems purchased or financed by the homeowner. This option is realized at a later date with a PACE Assessment when it is paid off, and with a lease or PPA when a buyout option is exercised.

When the PV system is owned outright (no outstanding obligations), or is being financed through a lending institution, one of the overarching issues facing homeowners with direct ownership is whether they can recover some of their investment if selling their home *before* payback is realized.[5] This can be solved with the proper recognition of the market value the PV system adds to the property.

Considering direct ownership options, a cash purchase is the lowest cost way to realize the benefits of the PV system, as the payback to the owner (in terms of electricity bill savings) will occur before any financed options. Other options include secured or unsecured loans as well as PACE financing which will vary in terms of the interest rate paid, which is primarily a function of the type of financing that is sought after, and the credit score of the homeowner. The homeowner is typically responsible for keeping the system fully functional to deliver the most benefits provided by the PV system. In some cases, additional monitoring and operation and maintenance contracts can be purchased from the installer. Monitoring systems can help identify performance issues, which when found early and remedied, will ensure the quickest payback.

When the PV system is owned outright (or still being financed through a secured or unsecured loan) and the property is listed for sale, the listing agent is typically the first person to encounter the property and work with the seller to complete the seller's disclosure statement. This presents an opportunity to capture the PV system information in a way that will be available for all parties in the transaction process both now and into the future.[6] This is done by the listing broker working with the property owner to fill out the Appraisal Institute's Residential Green and Energy Efficient Addendum (AI, 2013) as it will give the assigned appraiser the necessary information to develop a value for the PV system. If the property owner is seeking to refinance

[5] For a PV system owned outright by the homeowner, the payback is the amount saved that would have been paid to the utility if PV were not on the home. For a financed system, this payback period is longer due to the additional financing costs.

[6] Information gathered in this manner could be used by appraisers to eventually develop a paired sales analysis with PV systems nearby the property being valued.

their existing mortgage obligations, the owner can fill out the same form and make it available to the appraiser along with any documentation associated with the PV system.

1.1. Standard Appraisal Methods

The appraiser will use what are considered standard appraisal methods, considering the market conditions, available data and type of property being appraised. Typically these methods are based on the use of one, two or all three of the following approaches:

- sales comparison approach "paired sales,"
- cost approach, and
- income approach,

The income approach to value requires a greater understanding of how a PV system operates and detailed justifications for parameters used to develop the value. The cost approach can also be utilized as it is easier to justify for newer systems, however the presence of tax credits[7] and utility rebates complicates the matter as a true replacement of the system may not qualify twice for any rebates or certain tax credits. The cost approach is further complicated by the likely presence of superadequacy or functional obsolescence if incentives and rebates are not available. Credible paired sales are difficult to develop for PV systems as not many markets have the density of installed PV systems to justify this approach. In many areas with sufficient installations, available data may still be insufficient to make credible paired sales. At this point in time the PV system will most likely be valued using a combination of the three approaches, depending on the appraiser's market area (Klise et al., 2013).

Currently, the income and cost approaches are being used by appraisers since there are limited sales of homes with PV, and a national database of verifiable PV locations, system sizes, and site specific estimated performance data from reliable professional sources has not yet been created, which would allow appraisers to find similar comparable sales. A recent study conducted by an appraiser in north Denver looked at all three methods for developing the contributory value of an owned PV system, with the resultant method chosen to develop the value based on information gained from the interaction of the buyer and seller in the transaction (Colorado Energy Office, 2013).

When an appraiser uses the income approach, they can develop their own discounted cash flow model, or use the one provided with the PV Value® tool.[8] Use of this tool gives an appraiser the latitude to consider the age and condition of the PV system as well as ways to incorporate risk associated with its observed condition or local market conditions. The appraiser may make adjustments for shading, or potential roof repairs/replacement that could result in a lower value than if a similar system were unshaded and/or did not need a roof replacement. Comparing actual output gathered from a monitoring system with modeled output from PV Value® or another tool will help the appraiser determine if the PV system is operating as designed. Considering the location of the PV system, as well as the appraiser's knowledge of the market for homes with PV

[7] Tax credits are not a market value consideration.
[8] The PV Value® tool can be accessed from: http://www.pvvalue.com

systems, this information will help determine an appropriate discount rate, which has a large impact on the present value of the energy produced by the PV system. Also, appraisers do consider whether the market will support the valuation, which can impact the opinion of value developed by the appraiser through an adjustment of the risk premium (basis point spread). The appraiser-developed value will then be listed as a line item separate from the value determined for the rest of the property so the underwriter can compare the value of the residential property with and without the PV system.

An important facet of appraiser training and continuing education is the concept of competency[9] especially if the appraiser is not familiar with how to properly develop value for a PV system. Appraisers should be asking questions about the PV system's energy production, ownership, age, warranty, costs, and inverter warranty to develop a credible value opinion. It is also worth noting that if the appraiser does not understand the PV system and its potential contributory value, then they cannot simply state that it has no value. An appraiser needs to fully support their analysis, and conclusions. Proper adherence to USPAP competency rules requires that a value of $0 for a PV system show just as much support for that conclusion as a line item adjustment showing that the system has value greater than $0.

1.2. Renewable Energy Credits

In some cases, the homeowner will have renewable energy credits (RECs) or production based incentives (PBIs) that could be potentially valued. The appraiser may consider the length of the REC or PBI contract as some are fixed over a 5 to 20 year period, and some vary year to year as they can be traded in a REC market. Some companies offer a service to buy the RECs at a set price and insulate the homeowner from REC market fluctuations. It may be more difficult for an appraiser to develop a REC value based on the annual fluctuations in value. Some lenders may consider RECs or PBIs intangibles and not a real estate asset; therefore appraisers must work within the lender's scope or guidelines.

1.3. Market Value vs. Financial Value

It is important to note that the "market value" ultimately developed by an appraiser may differ from the "financial value" enjoyed by a homeowner that owns or leases a PV system. For example, two identical 5 kilowatt (kW) PV systems located on adjacent properties with the same square footage will have a different financial value to the homeowner if one partially offsets peak tiered rate charges while the other offsets usage that never reaches that highest tiered rate; the avoided cost as a positive financial value to the homeowner may or may not directly transfer to market value based solely on different electricity consumption patterns. This is also true of a PV system that has reached the end of the warranty lifetime; it may still have value to the homeowner that is paying less for electricity, but the resulting market value may be adjusted lower due to obsolescence, replacement cost outside of warranty, or the need for a roof replacement.

[9] According to USPAP, competency is gained by an appraiser having the knowledge and experience to complete the assignment. See page U-11 in http://www.uspap.org/#/32/zoomed.

2. PACE ASSESSMENT – PV SYSTEM ATTACHED TO PROPERTY

With a PACE Assessment, the loan for financing the PV system is attached to the property and not the current owner of the property;[10] it becomes property of the homeowner when the assessment is paid off. These types of assessments are not the same as a tax or mechanics lien that must be paid off when the home is sold; rather it is similar to the lien on your property for water and sewer service that can transfer with home ownership. Most water and sewer liens are already attached to existing properties in established neighborhoods and do not typically add or detract to the home's value. However, some water and sewer liens are voluntary or mandatory based on new subdivision regulations, especially for new subdivisions or rural areas that switch from well and septic to municipal infrastructure. The capacity charges assessed for these properties are amortized over a set number of years though can be paid off early, or passed to a new homeowner. In these cases, an appraiser may consider the impact to value depending on how unique the lien is compared to other similar properties as well as the total outstanding balance that would then be the responsibility of the new homeowner. A PACE Assessment for financing solar PV is voluntarily entered into, and is similar to the new municipal utility hookup example in terms of how an appraiser will consider the assessment balance when developing the market value of the PV system. Selling the property with the PACE Assessment may result in one of the following (Coughlin et al., 2010):

1) the PACE Assessment is assumed by the buyer
2) the PACE Assessment is paid off by the seller during sale
3) the PACE Assessment is paid off early before the home sale

In the first and second cases, the appraisal will show the PACE Assessment and also the value of the PV system and make an adjustment based on other similar sales with PACE Assessments. Since the assessment is staying with the property and being assumed by the next homeowner, the PV system may not add any value until the potential market value is greater than the PACE Assessment balance. Again, this depends on data from sales in the particular market. If the appraised value of the PV system is *less* than the remaining PACE Assessment balance, it may create a negative equity effect that can reduce the value of the home. In the third case, the seller pays off the assessment before listing the home for sale, hoping to recover that payoff amount by increasing the sale price of the home.

Residential PACE Assessments also pose potential valuation issues that appraisers will consider if a PACE loan is subordinate to the first mortgage. This is due to the Federal Housing Financing Agency (FHFA) statements that conventional loan backers, such as Fannie Mae and Freddie Mac will not purchase a mortgage with a PACE Assessment that is superior to the first mortgage.[11] FHFA's response is that for those PACE Assessments made before July 6, 2010, and are in the first lien position, then there are requirements that equity in the property is used to first pay off the remaining PACE Assessment, if possible.[12] Other states have subordinated PACE loans to a

[10] For recent information on locations that offer residential PACE, the reader is encouraged to visit: http://www.dsireusa.org/solar/solarpolicyguide/?id=26& http://pacenow.org/pace-programs/

[11] Because this is an assessment on the property itself, FHFA's concern is that the repayment of any remaining loan amount would take precedence over the repayment of the mortgage. See http://www.dsireusa.org/solar/solarpolicyguide/?id=26

[12] Freddie Mac Bulletin Number 2010-20, August 31, 2012. Available at: http://www.freddiemac.com/sell/guide/bulletins/pdf/bll1020.pdf

second lien position based on some of the challenges presented when the mortgage is sold to Fannie Mae or Freddie Mac, and some programs continue to keep PACE Assessments as a senior lien.[13] Some residential PACE programs work with homeowners who have already paid off their home where the FHFA concerns do not apply. A conversation with a representative of the Boulder County Climate Smart Loan Program indicated that properties with existing PACE assessments have been able to refinance, though in cases where the property is sold, the assessment must be paid off if the buyer is financing the purchase, though not required if it is a cash purchase.[14] Due to the issues discussed above, it is even more imperative that a competent appraiser is used when a home with at PACE Assessment is undergoing a home sale or refinance.

3. PV MARKET VALUE WITH OWNED, FINANCED AND PACE OPTIONS

To conceptualize the different value propositions, Table 2 below compares the potential "market value" of a hypothetical PV system calculated using an income approach that is: 1) owned outright, 2) owned under a conventional mortgage, and 3) financed with a PACE Assessment. It is important to note that this analysis is meant to illustrate the differences in the potential market value of just the PV system using only the income approach. The appraiser may also consider cost or comparables if they can provide enough support for the analysis. Other factors identified by an appraiser that could potentially reduce the values shown in Table 2, may include condition, shading, obsolescence, aesthetics and what the market will bear. These results also do not consider simple or modified payback which would be necessary for a cash flow analysis. The focus here is to better understand these different ownership options in terms of how an appraiser will develop market value. REC or PBI values are not included here due to the uncertainty in prices for tradable RECs and the different length of long-term contracts for fixed payment RECs or PBIs. The results in Table 2 were obtained using PV Value®, including a PACE payment calculation feature that was created internally though not available in the current version. Assumptions for this PV system include the following:

- 4 kW PV system
- System analyzed at five year age intervals, from 0 to 25
- Cost is $5.00/W Gross, Net result only factors 30% ITC
- Zip code: 95476
- First year energy production is 6435 kWh/yr
- 0.86 derate factor
- 0.5%/yr degradation rate
- Latitude tilt, panels facing due south
- 7.63% average discount rate (25 and 100 basis point spread on 7% risk free rate)
- Average utility rate 14.61 c/kWh
- 2.05% utility escalation rate (California average)

[13] Renewable Energy World.com news article. Available at: http://www.renewableenergyworld.com/rea/news/article/2013/09/residential-pace-energy-programs-pursue-innovative-approaches

[14] E-mail correspondence with Tracy Whitbecker, Boulder County Climate Smart Program on August 21, 2013.

- O&M at 75 c/W

For PACE Analysis

- $14,000 Net used in PACE analysis
- 7% PACE financing rate for 20 years

Table 2. Potential market value of the PV system using the income approach, comparing owned outright, owned with conventional mortgage, and the three PACE cases

Age at time or appraisal (yrs)	Owned outright (no outstanding obligations)	Owned PV system with conventional mortgage[i]	*Remaining PACE principal balance*	PACE Case #1 – Assessment assumed by buyer	PACE Case #2 – Assessment paid off during sale	PACE Case #3 – Paid off before home sale
New	$11,665	$11,665	*$13,658*	$-1993	$-1993	$11,665
5	$9360	$9360	*$12,036*	$-2406	$-2406	$9630
10	$7052	$7052	*$9281*	$-2229	$-2229	$7052
15	$6737	$6737	*$5418*	$1319	$1319	$6737
20	$3753	$3753	*0*	$3753	$3753	$3753
25	$0	$0	*N/A*	0	0	0

i – Conventional mortgage indicates the PV system was financed through a product that offered a higher loan for the entire property (purchased or refinanced) based on the proven energy savings from the PV system, which allows the customer to borrow more. The PV system is then installed after the home is purchased. The remaining PACE payments (principal balance) are shown to understand the values in case #1 and #2.

NOTE: This table does not consider simple or modified payback as well as any pre-payment penalties (if any) that the homeowner would have to pay if the PACE Assessment is paid off early.

The results in Table 2 illustrate the potential market value of the PV system using the income approach, which an appraiser would then adjust as necessary and add to the value of the property. Essentially, if there is no PACE Assessment, the market value of the PV system at each 5-year interval would be the value indicated by the income approach, and any adjustments made by the appraiser. The PACE cases #1 and #2 indicate that the appraiser will consider the assessment and remaining balance when reconciling with the income approach. This then becomes a negative equity situation for at least the first 10 years in this example, which will then reduce the market value of the PV system. Between the PV system's 10th and 15th years of operation, the assessment amount is less than the potential market value, resulting in a positive equity situation. At year 20 when the assessment is paid off, the market value is the same for all ownership options.

Simple and modified payback is not calculated here as it has no bearing on the market value developed by the appraiser; however it may factor into consumer decision-making among other metrics. A look at how payback interacts with market value would reveal that the PV system owned outright has the quickest payback.[15] The PV system with a conventional mortgage and PACE financed PV system would be paid back later due to the added financing cost. Most paramount to this discussion is that even if the PV system is not yet "paid back" the value received for the PV system when the home is sold may be greater than the remaining payback.

[15] Simple payback is the point in time when the sum of the funds not paid to the utility equates to the net amount paid in cash for the PV system. For example, the net cost of a PV system is $20,000 and a simple payback of 5 years means that the homeowner was able to save $20,000 in cash not paid to the utility company. Modified payback is similar, though it accounts for the cost of financing, which depending on the interest rate paid, will push the payback further than a PV system paid for with cash.

An example of this in Figure 1 shows that even for a system that has a simple payback of 15 years, if the value of the PV system (calculated using PV Value®) is recognized during the home sale, that value may be greater than the remaining payback and can be unlocked by the homeowner at the time of sale, instead of having to wait until year 15 to break even. This recognition of market value can give homeowners some assurance that there will be a return on their investment even if they sell their home before the payback period is over. The cases when the PACE assessment carries through during the home sale will most likely have the longest payback due to the early years when the assessment balance may be greater than the potential market value.

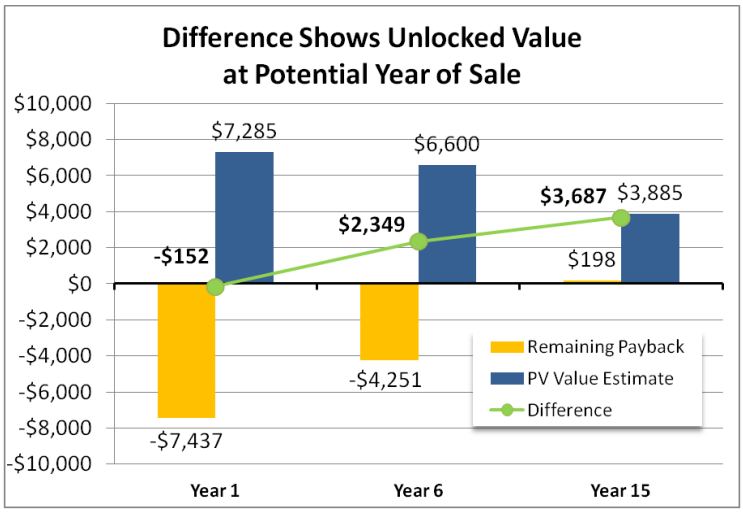

Figure 1. Hypothetical PV system with simple payback showing the difference between potential market value and remaining payback amount. The difference is the amount that can be unlocked during the home sale, well before the payback is reached.

4. HOMEOWNER LEASES PV SYSTEM FROM THIRD-PARTY

Until a few years ago, direct ownership by the homeowner was the only option for realizing the benefit of PV systems. More recently, third-party ownership has emerged as an alternative that reduces the cost of entry and transfers the burden of system maintenance from the homeowner to the third-party. This type of ownership is now authorized in more than 22 states at the time of this publication.[16] Third-party agreements, which include lease and Power Purchase Agreements (PPA's) are a relatively new option for obtaining some of the benefits of a PV system,[17] and are

[16] Map compiled by DSIRE, updated in February 2013. Available at: http://dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf

[17] The contracts between a lessor or PPA provider (third party system owner) and a lessee or power purchaser (homeowner) have been in a state of flux recently due to the different ways that the third-party owners have attracted and utilized capital in order to develop their business model. There is an effort underway by the National Renewable Energy Laboratory (NREL) to help standardize many of the third-party lease agreements which may aid in the securitization of solar assets, similar to how home mortgages are securitized and sold to free up capital for additional loans. SolarCity securitized a portion of their leases in late 2013, and is the first third-party solar provider to develop this asset class for a pool of residential solar leases. These efforts may ultimately lead to more standardized language within the lease agreements, lower financing costs, and less uncertainty for homeowners to navigate when understanding their roles and responsibilities with regards to the terms and conditions. See https://financere.nrel.gov/finance/solar_securitization_public_capital_finance

extremely popular in some states due to the fact third-party owned PV systems are being installed at a much higher rate than those purchased by the homeowner.

When a homeowner enters into a contract with a third-party PV provider, it is typically done in the following ways: 1) Monthly lease payment is made for the PV system with or without a down payment 2) Up-front pre-paid lease payment is made for a portion of, or the entire lease amount, or 3) a PPA is entered into where the homeowner purchases the power (per kWh generated) produced from the PV system. Some, but not all leases and PPAs have buyout options that allow the transfer of ownership from the third-party to the homeowner. There may be an early buyout option in 7 years, and/or one at the end of the term, typically at 20 years. Others do not have an early buyout option. As many third-party providers offering these products understand that homeowners may end up moving and selling their home, there are options for transferring the lease or PPA obligation to the new owner, transferring the leased PV system to a new home in the same utility service area, having the homeowner buy out the lease and obtain ownership of the PV system before selling the home, or having the homeowner buy out the remaining lease payments and transfer the no-fee lease contract to the new homeowner. The value that is placed on the buyout of the lease in some cases is the amount in the lease buyout table. In other cases it may be the higher of either the FMV developed by an independent appraiser, or the amount shown in the buyout table in the specific lease agreement.

Some of the questions that follow in terms of value include:

1) The FMV of the PV system for an early buyout or termination.
2) The FMV of the PV system for end of contract ownership transfer.
3) Any market value the third-party owned system may contribute to the property value during a refinance or sale of the property *during* the lease agreement.
4) Any market value that may contribute to the property value during a refinance or sale of the property *after the lease transfer in ownership* has been made.
5) The difference between FMV and market value with respect to how the PV system is valued at different transaction and ownership stages.

4.1. Existing Lease and PPA Structures

Before exploring the questions above, it is important to discuss the way these leases are structured as it has a large impact on the market value, FMV, and potential penalty payments for breach of contract or early buyout. The third-party company (lessor) *typically* structures solar PV for residential customers as an operating (true) lease based in part on guidance from the IRS for the wind industry (Reznick Group, 2012). With an operating lease, the lessor gets to take all of the tax benefits and other incentives available that in some cases the homeowner would take if purchasing the system. Some of the tax benefits available to the lessor are only available for businesses, such as being able to depreciate the equipment over a short period of time, which is often less than the typical asset class life.

So the reader can differentiate between the two most common leases, the other type of lease is a "Capital" (security interest) lease, which is generally restricted to a commercial customer (lessee) who can utilize the tax benefits to offset their tax liabilities. Capital leases may have the option for a $1 or nominal buyout, or even allow for the eventual purchase at a certain

percentage of the residual value. A capital lease typically requires that the asset be listed on the lessee's balance sheet along with the payment obligation, similar to a loan or security interest vs. an operating lease where the PV system would typically be listed on the lessor's balance sheet (FASB, 1976). The authors are not aware of any widespread adoption of residential PV leases explicitly structured as capital or security interest leases, therefore the operating lease structure will be assumed to apply. There are large differences in the tax code in how these leases are treated, and therefore that is what drives a great deal of the lease contracts in terms of explaining what the FMV may be at the end of a specific year within the contract.

A recent paper by SEIA (2013) sheds some light on FMV for large PV systems and some of the tax implications that follow. It is important to note that this report is focused on larger PV systems with more complex ownership structures. For smaller PV systems where an independent third-party (appraiser) may be tasked with developing the FMV, this paper offers some insight into what may be required for a residential PV lease that is undergoing an ownership transfer. What is notable is that this SEIA paper recognizes the benefits of using an income-based approach for valuing a PV system due to the limitations of having enough comparable sales for using a market approach, the challenge of understanding obsolescence, and the inability to include income considerations of power purchase agreements and solar renewable energy certificates when utilizing the cost approach.

Some of the same third-party vendors that offer a solar lease also offer a PPA, although may be more or less common in some markets than operating lease agreements for residential systems. PPA's allow the homeowner to purchase the electricity generated from the third-party PV system owner for a fixed timeframe. These PPA's have buyout and early termination provisions similar to some of the language in monthly and pre-paid leases.

4.2. Value Proposition for a Third-Party Owned PV System

From a homeowner's perspective, the financial value of a leased PV system or PPA is realized by being able to make payments that will ultimately be less than their current electric utility bill payment. The advantage of having on-site monitoring is attractive to some customers as the burden of ensuring the system is functioning properly is left to the third party. This type of service is not always offered in the same manner as monitoring service contracts for PV systems that are owned by the homeowner.

Understanding how the lease or PPA is structured and who owns the system is key to how an appraiser will value the contribution of the PV system to the property value. For example, In California, it is required to have third-party ownership of the PV system recorded in the public record. There is also an effort to develop fields in the Real Estate Standards Organization (RESO) Database that differentiate customer owned vs. third-party owned PV systems.[18] It is important that the appraiser have access to information that will show if the homeowner or third-party owns the system as this will impact potential valuation considerations for the subject property, or the use of comparable properties where homes compared against the subject property have either customer owned or third-party owned PV systems.

[18] As of August 2013, enumeration fields in version 1.2 Draft have a distinct field for customer owned and third-party owned PV systems. http://www.reso.org/

The market value consideration for a residential property with a third-party owned PV system provides greater complexities for the appraiser, as the homeowner does not own the system; therefore, a bank would not typically loan against an item that a third-party lessor both owns and is benefitting from the tax situation by providing an operating lease to the homeowner or lessee. The third-party may also be borrowing money to purchase the equipment or may have pledged the asset against an upfront discounted payment of the future revenue stream, which may further complicate the ownership structure. This isn't to say the "energy savings" value cannot be potentially considered if there is sufficient data to support this type of analysis and underwriter concerns are addressed if money is borrowed to buy the property.

The USPAP Standards Rule 7-4 states that an appraiser is required to analyze whether or not leased personal property has any effect on value, which is a function of the scope of the assignment and whether it is required by the intended use or an intended user. Just because there is a lease, the terms and conditions may or may not have an effect on the value. This standard can apply to a FMV appraisal prior to an equipment ownership transfer, or for when a real property appraiser considers whether a leased PV system adds value to the real property being appraised.[19]

4.3. Potential Ways to Develop Market Value for a Third-Party Owned PV System

It is necessary to explore how an appraiser may conclude there is a market value despite the fact that while the homeowner is under contract with the third party, the PV system is "personal property" owned only by that third party. It may be possible to consider the present value of the future lease payments, and then deduct that amount from the present value of the energy produced. The appraiser would then have to calculate the present value of the PPA or lease payments and determine if the value of the electricity produced is indeed higher. It is important to note that the appraiser would then have to determine if the leased system is cash flow positive or negative, as that may have an impact on valuation attempted in this manner. This is primarily a function of whether the historical long-term utility escalation rate for the utility is greater or less than the payment escalation clause if present in the PPA or lease contract, among other factors. Solar PV lease or PPA agreements typically have an escalator clause that is used to increase the amount paid for the electricity, or lease payment in a way that follows the increase in electricity rates over time. The customer is locked into whatever rate is signed for at the time, and if the utility rate increases at a slower rate, or even decreases, the homeowner is receiving less benefit than what they've agreed to in their contract. If the rate increases higher than the annual escalator, then they are receiving a greater benefit than what is in their contract.

The appraiser may have access to the escalation clause in the lease or PPA contract, however it is advised that for calculating the present value of the income stream, the escalation rate should be calculated using a compound annual growth rate (CAGR) formula (utility specific if possible) tied to the remaining PV system lifetime. If there are 10 years remaining on the lease or PPA term, then the CAGR would be calculated for the past 10 years, with that rate entered into the

[19] See Section 7-4 in http://uspap.org/. See also USPAP Q&A, November 13, 2012. Available at: https://appraisalfoundation.sharefile.com/d/sc27b73788ae45df8

calculation of the present value of the energy produced. Because third-party companies have different ways of calculating the utility escalation rate that will likely not be available to the appraiser, creating an independent calculation helps satisfy the arm's length principle for an appraiser developing an opinion of market value or an independent FMV determination.

The pre-paid lease has the option where some or all of the lease can be pre-paid up front by the homeowner with the remainder paid according to the schedule in the lease. For an appraiser to value this lease, they could potentially compare the present value of the remaining payment, if any, to the value of the energy generated, or the present value of the utility bill savings. As some of these leases have an early buyout option at a specific date, homeowners in this type of agreement may exercise the option to purchase the PV system, subject to the early buyout amount, or FMV, if applicable.

4.4. Lender Considerations when Valuing Third-Party Owned PV Systems

Even more important for residential properties, the appraiser will need to understand if the property will be mortgaged or paid for with cash. If the property is mortgaged, it may or may not be sold on the secondary market or insured by the government. This ties into how the appraiser may consider if the leased system's energy value can be pledged as collateral to the mortgage lender if the homeowner does not own the PV system. A question the lender may consider is if the value of the pledged asset is recoverable during foreclosure and the PV system value was included in the original loan-to-value (LTV) calculation. During foreclosure, the third-party owner may decide to remove the system if payments are not being made, or may attempt to enter into a new lease agreement with a prospective home purchaser. It is important to note that the lender most likely will be unable to recover that added market value from the PV system originally included by the appraiser and accepted by the underwriter. This is not an issue when a home is purchased with cash, though it may be possible for a leased/PPA system as it may add value as personal property that could be captured when a lease/PPA is transferred to the homeowner purchasing with cash.

4.5. Valuing Renewable Energy Credits and Rebates

If allowed by state law, the third-party is eligible to have assigned to them, any rebates or renewable energy credits (RECs) that are typically available to the owner of the PV system. Some agreements allow for a reduction in the monthly or pre-paid payment through the assignment of any rebates or RECs to the third-party. In some states, the homeowner has legal rights to the RECs and is not required to assign them to the third-party. For example, one third-party lease agreement reviewed for this study states that for systems in Massachusetts, New Jersey, New York and Pennsylvania, RECs will remain with the homeowner.

It is possible to value RECs that are owned by the homeowner where the PV system is owned by a third-party. If there is a long-term guaranteed contract from the utility provider and the future REC's have not been sold, then an appraiser *could* consider that value. It is important though to restate that RECs may be viewed as intangible property by a lender, which may preclude any attempt to develop their contribution to the market value.

If the REC value fluctuates annually, this presents uncertainty as to what the future value of that REC will be, and an appraiser may choose to only consider one year of value for that specific year of the appraisal. In the case of a foreclosure, the PV system would have to stay operable for the lender to realize that value, which means the lender would have to pay for maintaining the electric service. Lender-owned homes do not always 'keep the lights on' in foreclosure situations.[20] A more important question is whether the RECs are assignable to the mortgage lender, what the value would be, and how the mortgage lender would capitalize on that value. These are all questions the lender would need to answer based on their risk parameters, and the Government Sponsored Enterprises namely Fannie Mae and Freddie Mac along with HUD, who to the author's knowledge have not yet addressed the capitalization issue of future REC payments on residential properties with solar PV.

5. COMPARISON BETWEEN TRANSACTIONS ADDRESSED BY LEASE OR PPA CONTRACT

Table 3 below is structured to summarize the different ways a third-party owned PV system may add value to the home, considering the multiple options in the lease/PPA terms. Using real examples of homes sold and refinanced with third-party owned PV systems would provide the most clarity, however it is unclear how the market will respond to these transactions. Once more of these leased/PPA PV systems begin to transfer ownership and specific data is obtained, there will be future opportunities to better quantify market value and FMV. The information in Table 3 can be further refined when sales data is available to better analyze these transactions. Until underwriters develop explicit guidelines for appraisers and lenders, the statements below are intended to be used as a guide for what may be *possible* considering our current understanding of third-party agreements for PV and standard appraisal practices.

Table 3. Different transactions that may apply to a lease or PPA contract – Impacts to market value

Home Sale	**Potential Market Value Added to Home from PV System**
• Home sold – lease/PPA payments transferred to new homeowner	• As underwriting guidelines are unclear, most likely not if buyer is financing. Lease may be seen as encumbrance that may or may not impact how the homeowner sets the list house price and whether a concession may occur to get the buyer to take over the lease payments. Appraiser may consider concession when valuing home. • If buyer pays for the home with cash, appraiser may potentially consider whether value can be added. • REC value *possible* if RECs are owned by homeowner and not by third-party. See previous discussion on assigning RECs to lender.
• Home sold – lease/PPA is paid off by seller before sale and new owner takes over lease with no future payments	• The benefit goes to the new homeowner that gets the PV system, but does not have to make any lease/PPA payments. Homeowner may try and ask for more to offset the buyout and appraiser could look to develop the present value of the energy produced, or utility savings over the remainder of the lease term; however the appraiser needs to consider potential underwriting concerns as discussed above. • If buyer pays for the home with cash, appraiser may potentially consider whether value can be added.
• Home sold – leased/PPA	• No – Home sold has PV system removed, so no benefit to hew homeowner. Lease/PPA

[20] In humid climates, the air conditioning may have to be maintained to keep mold and mildew from causing damage to the property, therefore in this situation, the PV system could theoretically be generating REC credits for the lender.

PV system transferred to new home in service area	is transferred to new home in utility service area.
• Home sold – leased/PPA PV system bought out at amount specified for that year in buyout table	• Seller may try and recover the buyout amount when listing the home, however value will be based on what the market can bear, including PV system condition, shading, obsolescence and potential aesthetics. • If REC credits are owned by the homeowner, or can be transferred back to the owner during the buyout, there could be additional value added to the PV system. See previous discussion on assigning RECs to lender.
Home Refinance	
• Home refinanced with existing leased/PPA PV system on house	• The mortgage company should still allow lease to transfer, though they may consider the debt payment, which could impact the total obligation-to-income ratio for the refinance. • It is not yet clear whether any equity could be added to the house based on energy produced by the PV system, however an appraiser may potentially consider utility bill savings alongside any remaining payments or utility bill savings alone if the entire lease is pre-paid. • REC value *possible* if RECs are owned by homeowner and not by third-party. See discussion on assigning RECs to lender.
Lease/PPA Buyout	
• Contract specified early buyout	• After buyout, the PV system is then owned by the homeowner. FMV paid for the lease/PPA buyout may or may not be the same as the potential market value if the homeowner tries to sell or refinance the property right after the buyout. • If REC credits are owned by the homeowner, or can be transferred back to the owner during the buyout, there could be additional value added to the PV system. See discussion on assigning RECs to lender.
• Contract specified end of lease/PPA term buyout	• After buyout, the PV system is then owned by the homeowner. FMV paid for the lease/PPA buyout may or may not be the same as the potential market value if the homeowner tries to sell or refinance the property right after the buyout. • Most all REC contracts are only a few years, with some up to 15 years. There will likely be no REC income realized the lease/PPA is bought out at the end of 20 years.
End of Lease/PPA Term	
• Lease new PV system or enter into new PPA	• If home is sold or refinanced after another leased/PPA system is added, see discussions above and below.
• Abandonment	• If PV system is not removed by the third party as outlined in the contract terms, the PV system would then be the property of the homeowner. If home is sold or refinanced after this point, see discussions below.
• PV system removal	• PV system has been removed and cannot add any value to the property.

5.1. Home Sale

Depending on the language in the lease contract, the third-party may allow for ownership transfer. These options may apply to monthly and pre-paid leases, as well as PPA's.

1) If the home is sold *before* the contract is up, the lease/PPA may potentially be transferrable to the new homeowner. Value considerations as mentioned above in terms of whether leased PV systems add value, and whether value from homeowner-received RECs can be recognized are valid during this transfer. The appraiser can make those determinations once sufficient data is provided.

For a pre-paid lease, which is assumable by the home purchaser, the home seller could negotiate with a prospective home purchaser a separate personal property agreement for the remaining pro-rated portion of the pre-paid lease. In this event, the appraiser would need to be notified that the PV system is third-party owned and the lease is being assumed by the home purchaser. The appraiser will need to have access to the lease terms for analysis.

It may be possible, depending on underwriter considerations (if applicable), to consider the value of the "energy savings," which would have to be determined based on data that quantifies the savings realized by the home seller *after* installing the PV system. This would also have to be done on a present value basis considering any outstanding payments, though if the lease were fully pre-paid then it would be easier to quantify the value of the energy saved.

2) For some monthly leases or PPA's, the homeowner may have the option to pre-pay the remaining lease/PPA (as there is no buyout option) and the new owner of the home gets the PV system lease/PPA benefits, such as O&M monitoring, but isn't obligated to any of the payment attributes. An example of this is outlined in a monthly lease contract example from a national third-party PV provider (SolarCity, 2013). They state that you can then add the cost of the lease to the price of the home. The ownership of the PV system is still with the third-party and questions presented above with regards to an appraiser developing an opinion of market value for a leased system would still apply; the leased/PPA PV system may or may not receive any contributory value depending on underwriter requirements if the home is financed.

It may be possible, depending on underwriter considerations (if applicable), to consider the value of the "energy savings," which would have to be determined based on data that quantifies the savings realized by the home seller *after* installing the PV system. This would also have to be done on a present value basis considering any outstanding payments, though if the lease were fully pre-paid then it would be easier to quantify the value of the energy saved.

3) When the lease is moved to a new home in the existing service area, there is no value added to the existing house as the PV system will be removed. When the PV system is removed from the roof, the leasing company will typically restore the rooftop if any penetrations are made. This may or may not result in an additional cost to the homeowner, depending on the lease language. If the system is removed from the roof and repairs are not made correctly or create an aesthetics issue, this could negatively impact the property value.

4) What about buyout of the lease/PPA before the home is sold? If the home seller chooses to buyout the lease/PPA and own it outright, then proper documentation would need to be provided to the appraiser and mortgage lender showing a transfer of ownership, so that an opinion of value for the PV system can be developed by the appraiser and reflected in the appraisal. The buyout in one lease agreement reviewed by the authors is the amount in the buyout table, with no discussion on having a FMV appraisal. This is likely due to the fact that the contract was broken, and a FMV determination is not necessary. This area needs to be explored in more detail with other lease agreements.

5.2. Home Refinance

The contract language in many lease and PPA contracts states that the solar PV system as installed is considered personal property and not real property. If the homeowner is leasing the PV system under an operating lease and monthly payments are being made, typically there will not be an increase in value attributed by the PV system based in large part on the discussion above on whether the "energy value" generated by the PV system can be pledged as collateral to

a lender when it is not owned by homeowner. The mortgage lender may choose to consider the lease payment in the total obligation-to-income ratio for income qualification purposes.

It may be possible, depending on underwriter considerations (if applicable), to consider the value of the "energy savings," which would have to be determined based on data that quantifies the savings realized by the home seller *after* installing the PV system. This would also have to be done on a present value basis considering any outstanding payments, though if the lease were fully pre-paid then it would be easier to quantify the value of the energy saved.

5.3. Lease or PPA Buyout

What about purchasing the PV system under early buy-out/early termination options? In this case, the FMV will first be determined between the homeowner and the third-party; the PV system then becomes the property of the homeowner, and can be considered a part of the real property that can be loaned against and pledged as collateral. In some, but not all contracts the FMV is either identified as:

a. The value determined in the contract already agreed upon between the homeowner and the third-party,
b. a FMV determination made by an independent appraiser, or
c. the higher value of either the early buy-out/early termination table.

According to the IRS, the "Fair Market Value" (FMV) of a third-party owned item must be determined when transferring ownership from the lessor to the lessee.[21] The language provided in different solar lease contracts reviewed by the authors varies on this topic, depending on the agreement (monthly, pre-paid and PPA). The contracts also differ as to when or whether an independent appraisal is used, with or without the use of the third party's pre-calculated buyout/termination table. Terms are also different between third-party providers on who pays for the appraisal. Once FMV is determined and paid, the ownership is transferred to the homeowner. At this point, the FMV paid by the homeowner may or may not be the same as an opinion of market value an appraiser will arrive at during a real property appraisal. This is because FMV represents a transaction between the third-party and the homeowner regarding the PV system and not the property it is attached to. When the appraisal is performed to develop an opinion of market value, the appraiser considers the PV system *along with* the property it is attached to.

5.4. End of Lease or PPA Term

Extending or renewing an existing third-party lease/PPA
If a homeowner chooses to renew the lease or PPA, the third-party owner may use a FMV approach to determine how much the homeowner will pay for the lease/PPA renewal terms. The same discussion applies from above about whether a lease or PPA adds value to the home.

Removal of PV system due to contract expiring with third-party owner

[21] IRS Rev. Proc. 2001-28

When the lease or PPA term expires and the homeowner requests the PV system to be removed, any impacts to the property value would primarily be the result of the care taken to remove the PV system without incurring damage to the house, or making suitable repairs if damage is unavoidable. The lease/PPA contract typically outlines the process by which the system will be removed, and to what level any repairs will be made, if necessary.

What if the property was refinanced during the lease/PPA term? As discussed above, herein lays the challenge of attempting to place value on a third-party owned system to create added equity for a home if the homeowner chooses to have it removed at the end of the lease/PPA term. If equity was recognized due to the value of the energy production during a home refinance, what happens to that value when the leased/PPA PV system is removed? That value would evaporate, and this situation would then create a challenge to the lender if the house were foreclosed upon; the total value and LTV calculation were based on an item not considered real property during the term of the lease/PPA.

Lessor is no longer in business or PV system is abandoned

If the PV system is abandoned by the lessor, the homeowner will most likely need to provide documentation to the appraiser and mortgage lender showing that the lessor has abandoned the PV system to the lessee and no longer has an interest in the system. If there is a remaining useful life for the system, then it may contribute to the property value, however homeowners would need to consult with a tax professional to see how this would be treated for federal and state tax purposes.

6. CONCLUSIONS

This report lays out the different ways a home's value may be impacted as a function of who owns the PV system when the transaction occurs. What has been presented is based on an understanding of how appraisers and lenders are currently handling PV systems in real estate transactions, and how that will change through the use of proper valuation techniques. As homeowners typically stay in their homes for roughly 12 years (Emrath, 2009) it will take some time to see how market value and FMV determinations are made. Uncertainties discussed above will only be reduced with underwriter guidance that will help define what is allowable for the different ownership options presented in this paper for homes that are financed. Overall, the education of appraisers on the benefits of solar PV systems is key to successful completion of a market value or FMV appraisal that accurately reflects market conditions. The use of the PV Value® tool along with proper valuation techniques is one option for appraisers when tasked with determining value. Its release has been timely due to the increase in both the number of PV systems being installed and number of homes transacted with PV in the U.S.

Ownership of the PV system outright through a cash purchase or outside financing will typically be the easiest for appraisers when developing the value contribution of the PV system. There are some considerations for paying off a PACE Assessment depending the remaining payments and interaction between buyer and seller that appraisers need to be aware of.

For third-party owned systems, there is still much uncertainty as to how exactly market value and FMV will be calculated as installations of third-party owned PV system are just now beginning to increase in certain states, and some of the earliest contracts with shorter terms will be up for renewal or an early buyout transaction completed between the third-party owner and homeowner. Because there has been no research into this area to validate these newer ownership models from a market value standpoint as discussed in this paper, it remains to be seen how the market will react and what range of values is reflected in homes prices.

It is important to note that as PV system installation costs decrease, it will have a large impact on value as cost new will in most cases act as a ceiling to the results obtained when using an income approach, or reconciling cost with paired sales and income approach methods typically utilized by appraisers. Lowering costs may also change the balance between how consumers view entry into the PV marketplace; if incentives decrease and PV system pricing continues to drop, which ownership option will dominate? Will the predominant leasing structure be modified to accommodate these lower prices by changing to a capital lease? Future solar PV lease agreements may also change if the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) implement changes as outlined on the existing Exposure Drafts for changing how lease agreements are structured.[22]

What will ultimately benefit all stakeholders, including homeowners, appraisers, lenders, real estate agents, and third-party providers is a standardized, national database of all installed PV systems with detailed system characteristics as well as the ownership structure. This will help valuation professionals develop market value and FMV estimates, and potentially reduce uncertainty regarding which methods are most viable for developing value in different market locations. Studies are also needed that can provide more examples of homes sold with customer or third-party owned PV systems in multiple metropolitan area, which should describe the process that appraisers have utilized, success of the transaction, premium of system whether customer owned or third-party owned, and lessons learned to better understand market dynamics. These results will help reduce the uncertainty surrounding the value of the PV system for all ownership structures and help promote the value proposition to homeowners as they navigate through the many different options available for realizing the benefits provided by solar PV systems.

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