September 13, 2012

Mr. Alfred Pollard
General Counsel
Federal Housing Finance Agency
Attn: Comments/RIN 2590-AA53
Eighth floor, 400 Seventh St SW.
Washington, DC 20024

Re: Notice of Proposed Rulemaking on Enterprise Underwriting Standards Relating to PACE Programs (RIN 2590–AA53)

On behalf of Solar Power Electric, thank you for the opportunity to comment on the Notice of Proposed Rulemaking on Enterprise Underwriting Standards.

The purpose of the PACE program is to encourage residential property owners to make energy efficient improvements to their residences and finance those improvements through a tax lien. The Federal Housing Finance Agency (FHFA) has highlighted several concerns relating to implementation of the PACE program and has proposed a rule to not allow Fannie Mae or Freddie Mac to purchase loans backed by PACE loans, but offered three different Risk Mitigation Alternatives. The Second and Third Risk Mitigation Alternatives involve appraisal and/or loan-to-value ratio provisions.

We believe a thorough and credible appraisal process can enhance risk management, and we encourage FHFA to integrate such requirements in any plan involving PACE or loans backing properties with green or energy efficient features.

Further, the Notice provides several areas of comment relating to the unsettled nature regarding market impacts of energy efficient improvements. We will seek to resolve some of those questions from an appraisal standpoint, and we offer the following suggestions to enhance the Second and Third Risk Mitigation Alternatives:

Recommendations

1. Establish a scope of work for appraisals that requests analysis of green and energy efficient features on properties and requires use of highly qualified and competent real estate appraisers. We believe the appraisal requirements could be enhanced greatly by further commenting on, and potentially requiring, use of professionally designated real estate appraisers, or appraisers who have demonstrated competency in valuing properties with green features and/or energy efficient improvements. Such enhanced qualified appraiser program criteria would establish expectations of lenders regarding the identification of qualified appraisers of green or high performance properties, an addition that would provide additional credibility to any appraisal or LTV related requirement that seek to mitigate risk of both Enterprises.

   Further, we encourage establishment of a scope of work for an appraisal of a high performance property to include analysis of potential market impacts attributable to energy efficient or green fixtures or improvements. As a part of this, we believe FHFA should evaluate use of, or potentially require completion of, the *Residential Green and Energy Efficiency Addendum* (Form 820.03) published by the Appraisal Institute in any appraisal that is prepared on a property that has a PACE lien.[1] This addendum was developed to help appraisers analyze market impacts of green or energy efficient features. Despite not being required as part of any federal or state program, the Addendum has been used as a means of

[1] Available at http://www.appraisalinstitute.org/education/downloads/ai_82003_reslgreenenergyeffaddendum.pdf

communicating property level information to appraisers, and has been successfully used by appraisers in the field.

We believe it makes great sense for any program overseen by FHFA to include the *Addendum* as part of any program requirement established by FHFA of Fannie Mae and Freddie Mac to enhance risk assessment in the area of green buildings and energy efficiency. The Addendum can be used in conjunction with the *Uniform Residential Appraisal Report* (URAR) form required by Fannie Mae and Freddie Mac and enhance considerably the analysis of green and energy efficient features on the value of real property. This is especially true given that the URAR is wanting in the area of green and energy efficiency providing only has two specific areas in which appraisers can comment on such features. To compliment these areas, the Addendum provides a framework for appraisers to thoroughly analyze the markets impacts (if any) of such features.

2. In addition, we encourage FHFA to allow Fannie Mae and Freddie Mac to amend their seller/servicer guidelines to specifically allow use of the Income Capitalization Approach. Specifically, the guidelines should clarify that in the absence of paired sales data, two or more of the following methods may be considered and reconciled:
    a. Gross Rent Multiplier (GRM) x monthly savings (GRM can be from the market or proxy method)
    b. Published study from similar market area
    c. PV Value™ Tool or an equivalent system of analysis
    d. Present Value analysis with adequate explanation of the inputs
    e. Depreciated cost analysis (The market uses this method and there is plenty of support for current cost. The weak part of this method is accurately estimating depreciation; however, it can be done using logic). Lastly, the policy should ensure the impact of any tax credits are taken into consideration by the appraiser.

    These methods are recognized and have been taught and published for several years. This gives the appraiser options but it should be clear more than one method should be used and the two results reconciled.

Explained below, is the use of discounted cash-flow analysis for developing the present value (PV) of a solar photovoltaic system where there is market evidence for such an approach. Further, we will explain the research and education that is development between the Appraisal Institute, Sandia National Laboratories, and Solar Power Electric.

Appraisal Considerations: Valuation of Green and Energy Efficient Features
Generally speaking, professional real estate appraisers use three "approaches to value" to value real property. These are known as the "sales comparison," "cost" and "income capitalization" approaches. Green building has applications to all three approaches to value, the points of which are taught in widely attended seminars and courses offered by the Appraisal Institute and other organizations. As a means of introducing some of these concepts, some general aspects of the three approaches to appraising green/energy efficient buildings are found below:

Cost Approach

- The cost approach can be especially useful in appraising green retrofitted buildings, as the actual cost of the work being proposed is easily identified. Although cost does not equal value, knowing the costs of particular green components can help the appraiser gauge how they compare with traditional building costs and thus begin to weigh the cost against the perceived benefit. Buyers know cost and they do consider cost in their buying decisions.
- One important point to consider is whether any component or element of the building is a superadequacy. At times, new technology can be just that. For some components, such as a green roof, life-cycle cost analysis may be more accurate than straight-line depreciation for comparison with a traditional roofing system.
- Two of the largest cost data providers, *Marshall & Swift* and *RS Means*, have green cost guides (see www.marshallswift.com and www.rsmeans.com for more information). Although these guides are not fully

developed, they do provide insight into the costs of some green building components, and therefore, they can be helpful to appraisers.
- Note that cost alone does not reflect the added efficiencies available through integrated systems design. Three areas of the cost approach that may require more attention with green buildings are obsolescence, physical deterioration, and incentives.

Physical deterioration can also have an impact on value - a longer physical lifespan of a green building due to its durability may also alter the rate of physical deterioration and thus influence how the appraiser formulates part of the cost approach. Lastly, incentives can have a major impact on the costs for a green project and should be researched, understood, and applied by appraisers in their cost approach analyses.

Sales Comparison Approach
Appraiser considerations for the sales comparison approach involve both comparable sales selection and developing adjustments to sales prices to reflect physical differences. Some general considerations include the following:

- When undertaking comparable sales selection, because green building is an emerging field, there may be a shortage of data on recent sales available for a green subject property. This can be a larger issue in residential appraising than in commercial appraising, but the fact remains that often there are few recent green sales available for comparison. This lack of data may lead appraisers to expand the typical parameters of their comparable searches.
- Even if sales of green properties are available, it is important to remember how points-based certification systems operate: not all buildings of the same certification level are similar. Appraisers also need to understand the elements of the buildings themselves.
- The difficulty in obtaining sales data may also require appraisers to develop other approaches to value more fully and/or justify the weighting of the approaches in more detail in the reconciliation section of their reports.
- Features requiring adjustments in appraising green buildings are as follows:
    - Energy efficiency
    - Heating and cooling
    - Quality of construction
    - Water efficiency
    - Functional utility
- In most cases, a lump sum adjustment for all the features will be made because of the difficulty in accurately supporting an adjustment for each feature.

Income Capitalization Approach
As we will explain below, the income capitalization approach is useful to residential valuation questions using the Gross Rent Multiplier (GRM). However, the income capitalization approach is most common in valuing the commercial property. Some considerations for appraisers include:

- The useful life, physical deterioration, and obsolescence all come into play in the income capitalization approach as well as in the cost approach. Beyond these elements, the following items should be considered in the income capitalization approach when appraising green buildings:
    - *Income:* Do tenants of the green building pay a premium?
    - *Vacancies:* Are vacancy rates lower in the green building?
    - *Tenancy:* Is tenant retention better in the green building?
    - *Present value:* Are there anticipated future savings attributable to any green features in the building, such as HVAC or water system or energy savings?
    - *Operations and maintenance:* Does the durability of the building or its components mean that O&M costs will be lower over time?
    - *Incentives:* Are any rebates, permit savings, or other incentives available for this building because of the green features?
- It is important that appraisers remember that adjustments in the sales comparison and cost approaches may come from the analysis in the income capitalization approach. For instance, savings from water,

energy, and even maintenance can be derived through present value analysis and applied in both the sales comparison and cost approaches. For longer-lived items present in green buildings such as eco roofs, discounted cash flow analysis may be the best method for capturing benefits over time.

- The elements described above for the income capitalization approach all arise from differences between a green building and a traditional building. The differences between green and conventional buildings can guide appraisers in analyzing this emerging class of buildings.

PACE Considerations

The Appraisal Institute previously commented to FHFA on how appraisers would analyze properties with PACE liens, but we will reiterate them here and expand upon the application of the three approaches to value above. The existence of a PACE loan is comparable with situations that involve a special assessment for sewer or water. The special assessment can pass to the new buyer or be paid off by the seller. The sale price paid is negotiated based on who assumes the special assessment.

From a valuation perspective, it is important to understand whether a seller paid assessment influenced the sales price. This is best understood by comparing sales with a PACE Loan or Special Assessment to a sale without one. This comparison quickly reveals if the Assessment affected the price paid.

This is likely a form of sales or seller concession, and if so, recognized appraisal methodology would deduct this concession dollar for dollar under a "cash equivalency" basis, or if the market suggests the amount is less than market based on a paired sales analysis, the market-derived adjustment would be applied.

The example found at Table 1 below illustrates how the appraisal industry analyzes this type of situation. The appraiser would consider the PACE loan as a concession paid by the seller. As a result, the appraiser would deduct $10,000 from Sale 2's price because its price was increased by $10,000 ($185,000 - $175,000 = $10,000) because of the PACE Loan. It should be noted that there are no absolutes, and every situation is different, since every real estate market is different. However, this is likely to be a common scenario. This scenario is a typical occurrence in the City of Cape Coral, FL where some properties have special water and sewer assessments up to $16,000. Appraisers use the paired sales analysis shown below to develop adjustments.

Table 1

	Sale 1	**Sale 2**
Sale Price	$175,000	$185,000
Concessions	None- No PACE or Utility Loan	Seller paid $10,000 PACE Loan or utility payment
Financing	Conventional mortgage	Conventional Mortgage
Date of contract	7/2/2011	7/31/2011
Energy Efficiency	Good – HERS 55	Good- HERS 58

Of course, any positive impacts of the any fixed improvements or features of the property would also be analyzed by an appraiser. This includes cost and income considerations as discussed above in the description of appraiser considerations and the three approaches to value.

It is here – the application of the income capitalization approach - where we believe FHFA, Fannie Mae and Freddie Mac could provide strong direction to lenders, encouraging analysis by appraisers, mitigating risks to the Enterprises, and potentially resolving several areas of concern with regard to the PACE program, particularly as it relates to solar integration.

Background
The U.S. Department of Energy has, through several decades of R&D by Sandia National Laboratories, the National Renewable Energy Laboratory and others,[2] [3] [4] produced a wealth of data relating to the expected and actual performance of solar photovoltaic systems installed throughout all geographical areas of the U.S., with that data we can reliably and conservatively estimate the remaining lifetime energy production of a residential solar photovoltaic system including anticipated operations and maintenance costs (O&M).[5]

Need for using all methods of estimating market value that fall within the guidelines of Uniform Standards of Professional Appraisal Practice (USPAP) and available to appraisers
Solar photovoltaic systems have enjoyed widespread acceptance throughout the U.S. with the highest adoption rates in CA and NJ. However, even with those relative high adoption rates and continued successful deployment of residential-owned solar, it may be a decade or more before reliable and accurate sales comparables of homes sold with solar photovoltaics are available throughout every geographical area of the U.S. and covering every type of residence. The sales data sources such as MLS, public records, and private data sources are just beginning to implement searchable data fields to assist in measuring the market's reaction to these features.

In order to aid appraisers in developing the income approach, an algorithm (PV Value™)[6] was developed by Solar Power Electric in 2010 for use and illustration by the Appraisal Institute to develop the value of a customer-owned solar photovoltaic system based on a discounted cash-flow (DCF) analysis under the Income Capitalization Approach. PV Value™ follows the USPAP 2012-2013, guidelines specifically the statement on Appraisal Standard 1-4 (c) under the subject of discounted cash flow analysis. The algorithm has been developed initially as an Excel spreadsheet tool for appraisers, underwriters, real property assessors and others to use. Solar Power Electric and Sandia National Laboratories made the first version of the tool public in January 2012, and the most recent version was released on September 1st 2012. The recent version also applies to cost approach to provide a secondary method or test of reasonableness.

In light of this, and with a lack of comparable sales for the Sales Comparison Approach, we encourage FHFA when sales comparables are not available, to allow the Income Capitalization Approach, specifically the discounted cash-flow analysis as presented within PV Value™ for developing the market value of solar photovoltaic's within the Enterprises published appraisal standards.

Residential solar photovoltaic installations have a positive net present value in 10 states based on 2010 data
The proposed rule asserts "we are not aware of reliable evidence supporting a conclusion that energy efficiency improvements increase property values in an amount equal to the cost of the improvements".[7] Based on data available for 2010, the Appraisal Institute, Sandia National Laboratories and Solar Power Electric have indentified 10 states where the net cost after incentives of a residential solar photovoltaic installation is lower than the potential market value developed through the Income Capitalization Approach using a discounted cash-flow analysis. Once data for 2011 is available and reviewed, we anticipate that more states will be added to this list as installed costs decrease and utility rates increase. This analysis is preliminary as these represent new photovoltaic installations in 2010 that have not yet 'sold' though it does show the potential value of systems installed in different states as a function of the energy produced by the photovoltaic system.

As an income approach is sensitive to the amount of solar resource available, selected discount rate, utility rate and utility escalation rate, the 10 states where income approach value is greater than installed cost are dominated by both high average utility rates and high utility escalation rates. This shows that the value to the homeowner

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[2] Jordan D.C. and S.R. Kurtz (2011) Photovoltaic Degradation Rates – an Analytical Review. Prog. Photovolt: Res. Appl. DOI: 10.1002/pip.1182.
[3] Osterwald C.R., J. Adelstein, J.A. del Cueto, B. Kroposki, D. Trudell and T. Moriarty (2006) Comparison of Degradation Rates of Individual Modules Held at Maximum Power. Report number NREL/PR-520-39844. Presented at the 2006 IEEE 4th World Conference on Photovoltaic Energy Conversion, May 7-12, Waikoloa, HI.
[4] Perez, R., P Ineichen, K. Moore, M Kmiecik, C Chain, R. George and F. Vignola (2002) A new operational model for satellite-derived irradiances: description and validation. *Solar Energy*, 73:307-317.
[5] Menicucci, D.F. (1985) PVFORM – A New Approach to Photovoltaic System Performance Modeling, 18th IEEE PVSC, Las Vegas, NV, October 21-25, 1985.
[6] www.pvvalue.com
[7] Proposed Rule page 36091

can potentially be greater than the cost to install the system. When an appraiser uses all the tools available, the sales comparison data, income approach, and cost approach, the value range indicated by the approaches will be reconciled based on the strengths and weaknesses of each approach to arrive at a market value of the solar photovoltaic system. As utility rates increase, the more states may end up having a higher income approach value than installed cost. Currently, when the appraised value is below the income approach value, it should be noted that the savings by the homeowner could still be very high and the forgone utility bill will free up additional monthly income that could then be used to pay the PACE loan, or pay down the mortgage and increase their home equity position.

Funding awarded to further study the increase in value for residential properties with solar PV based on sales comparables

In August 2012, U.S. Department of Energy through the Sun Shot initiative, awarded funding for three years (FY's 2013-2015) to Sandia National Laboratories/Lawrence Berkley National Laboratory for the further deployment of the tool along with additional research into the market value that solar photovoltaic adds to a residence, and additional appraiser training on valuing solar photovoltaic with classes to be offered through the Appraisal Institute. An overarching goal of this work is to reduce installed costs by allowing homeowners the ability to access current low-rate first mortgage financing.

PV Value™ tool is FREE to use and available now

Version 1.1 of PV Value™ is currently available as an Excel spreadsheet; additionally PV Value™ is expected to be available as a web application in the spring of 2013 and will be accessible across most computer platforms and workstation environments. The PV Value™ tool is FREE to use and can be downloaded at www.pvvalue.com and http://pv.sandia.gov/pvvalue. A detailed user manual is available that outlines the assumptions used in the tool and outlines how to properly enter the inputs.

Sandia National Laboratories and Solar Power Electric presented two different webinars about the PV Value™ tool, which are available at http://pv.sandia.gov/pvvalue and at https://vimeo.com/40703731.

Appropriate Discount Rates used for DCF Analysis

FHFA has expressed reservations about appropriate discount rates and the methodologies used to determine them.[8]

We believe that the choice of an appropriate discount rate used in a DCF analysis is best left to a properly trained appraiser who is familiar with local market conditions and has accepted the appraisal assignment. The appraiser is best equipped to determine that discount rate based on current mortgage interest rates and additional risk based market factors. PV Value™ uses the FNM 30 or 15 year fixed rate 60 day commitment rate (a custom rate is also available in accordance with USPAP [9]) in addition to an appraiser chosen risk-based spread to determine the appropriate discount rate. That being said, a municipality can work with an appraiser or an assessor who is knowledgeable on how to value photovoltaic systems to ensure the PACE loan application accurately reflects current market conditions and utility rates.[10] The newest version of PV Value™ separates residential property from commercial property valuations to allow the input of appropriate discount rates by simply selecting the property type first.

Discussion on "Weighted average expected useful life of PACE-funded projects"

For solar photovoltaic systems, the PV Value™ tool calculates the useful life of the photovoltaic system through the module warranty, which is typically longer than any other component in the system. Typical photovoltaic module warranties are 20, 25 and 30-years. Now in many cases, the system may perform longer than the warranty period, however, risk to the homeowner includes having to make a roof replacement, and the cost to remove and re-install the same system may be greater than what it would cost to install a new photovoltaic system in the future. In addition, the financial risk of replacing one or many modules after the warranty may be difficult if that technology no longer exists and newer technologies may not be compatible. These factors also

[8] Proposed Rule page 36109

[9] Uniform Standards of Professional Appraisal Practice 2012-2013, Standard 2, Pages U82-U84, lines 2617-2710

[10] Barnes J., Heinemann A., Lips B. (2012) The Cost of Value: PV and Property Taxes, NCSC. Presented at ASES 2012

influence how an appraiser may choose a basis point spread to develop the discount rate used in the DCF analysis.

Implementation of PACE Payments Comparison to DCF Energy Value Analysis
FHFA has expressed reservations about the Third Risk-Mitigation Alternative specifically with the statement "The total energy and water cost savings realized by the property owner and the property owner's successors during the useful lives of the improvements, as determined by [a mandatory] audit or feasibility study *** are expected to exceed the total cost to the property owner and the property owner's successors of the PACE assessment," "no methodology for computing the costs and savings is provided."[11]

The version of PV Value™ attached uses a present value DCF analysis of the total PACE payments in comparison to the DCF Energy value analysis to determine if the solar photovoltaic project has a positive benefit-cost ratio or Net Present Value. The discount rate used in the PACE payment analysis is the same discount rate used for the DCF Energy Value Analysis, although it may be modifiable in future versions of PV Value™.

Appraiser Training Classes
The appraiser training classes that will be offered by the Appraisal Institute focus on fair market valuations of residential and commercial structures with solar photovoltaic. The first class is to be attended by appraisers and mortgage underwriters and is anticipated to be held in Washington DC in late winter/early spring 2013.

We encourage FHFA to participate in the inaugural class by sending senior individuals and underwriters from Fannie Mae and Freddie Mac who have direct knowledge of appraisal standards and specifically the income capitalization approach using the discounted cash flow method. This will be a working class with direct feedback desired from all attendees.

Research for 2010/2011 relating to the market value of residential solar PV to be published in the Appraisal Journal
Although we have done extensive research into the present value and net present value of residential solar PV by state, the findings are not slated to be published in the Appraisal Journal until Winter 2012/Spring 2013. We would be pleased to provide FHFA a pre-release copy of the article once the editor has approved it for publication.

Concluding Remarks
We have explained several concepts that may offer additional enhancements to the appraisal process for any program offered by Fannie Mae and Freddie Mac on the subject of PACE. We would be pleased to discuss these concepts in greater detail as FHFA reviews the public comments and deliberates on potential next steps.

We are also attaching several research articles[12] that discuss valuation issues, as well as some tools that could potentially be used by appraisers.

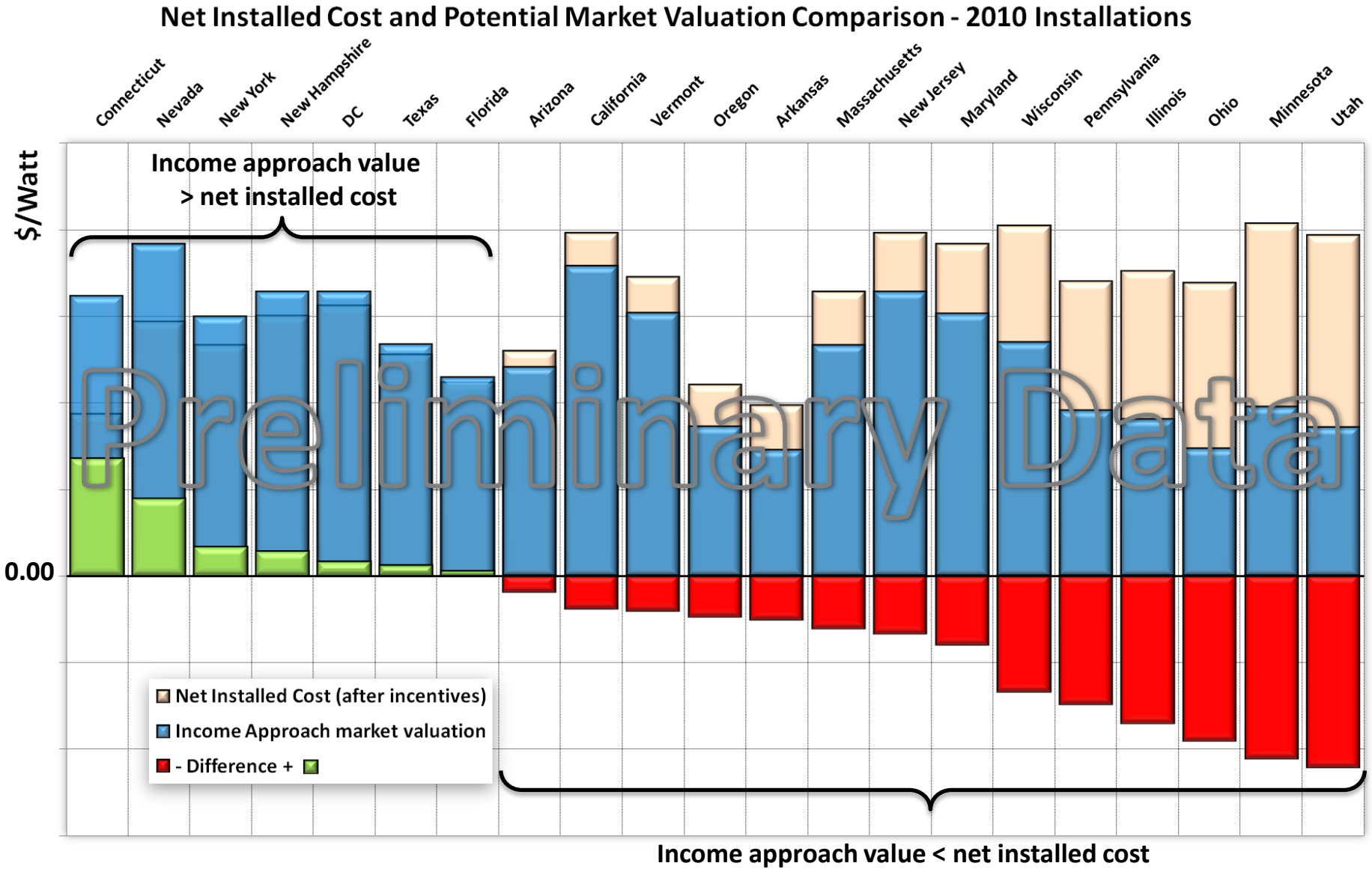
If you have any questions or would like to arrange a meeting, please contact Jamie Johnson, General Manager/Developer of the PV Value™ Algorithm at 941-380-0098 or jjohnson@spefl.com.

Sincerely,
//c
Solar Power Electric

Attachments

[11] Proposed Rule page 36109
[12] https://ases.conference-services.net/resources/252/2859/pdf/SOLAR2012_0356_full%20paper.pdf
http://www.costar.com/uploadedFiles/JOSRE/JournalPdfs/06.109_126.pdf

Residential Market



States shown are those used in Barbose et al. (2011) "Tracking the Sun IV" for installed cost comparison

SAND 2012-3149P

PV Value™ Photovoltaic Energy Valuation Model v. 1.1

Choose Property Type: (•) Residential — Single-family / Duplex/Villa / Townhouse / Condo — ( ) Commercial

Solar Resource Calculation		Discount Rate Calculation		Electricity Rate Inputs		Operation & Maintenance Inputs	
Zip Code	95403	Basis Points (low)	50		Pacific Gas and Electric Co.	15-Year O&M Expenses as a function of the system size	
System Size in Watts	5,000	Basis Points (high)	200			O&M Expenses ¢/W	55
Derate Factor	0.770	Basis Points (average)	125	Residential Rate ¢/kWh	15.00	☐ User Defined (check box) ¢/W	
Commissioning report # is required to override default derate factor		Choose Net Yield Rate				Est. Inverter Replacement Cost	$ 837.36
Commissioning Report #		FNM 30-Year Fixed 60-day / FNM 15-Year Fixed 60-day / Custom		☐ User Defined (check box) ¢/kWh		System Age and Remaining Lifetime	
Module Degradation Rate	0.5			Utility Escalation Rates for California		Module Warranty/Years	25
Array Type	Fixed			Residential Escalation Rate - EIA	2.06	Age of System/Years	0
Array Tilt (unchecked = latitude)	☐ 22.0	Custom Rate	7.00			Remaining Energy/Years	25
Array Azimuth (default = South)	180	Discount Rate (low)	7.50	☐ User Defined (check box)			
	kWh Produced/Year	Discount Rate (average)	8.25			Is this ☐ Lease to Purchase option?	Check for Buyout Valuation
	6,862	Discount Rate (high)	9.00				

User Input
User Input Override
Calculated Value

Appraisal Range of Value Estimate	
Low	$ 11,567.97
Average	$ 12,330.34
High	$ 13,176.31

Present Value Estimate of Accumulated Energy Production

Year	KWh Production /YR	Energy Value /YR (low DR)	Accumulated Energy Present Value with O&M Expenses (low DR)	Energy Value /YR (average DR)	Accumulated Energy Present Value with O&M Expenses (average DR)	Energy Value /YR (high DR)	Accumulated Energy Present Value with O&M Expenses (high DR)
1	6,827	$ 1,024.10	$ 1,024.10	$ 1,024.10	$ 1,024.10	$ 1,024.10	$ 1,024.10
2	6,793	$ 967.35	$ 1,991.45	$ 960.64	$ 1,984.74	$ 954.03	$ 1,978.13
3	6,759	$ 913.71	$ 2,905.16	$ 901.10	$ 2,885.84	$ 888.74	$ 2,866.87
4	6,724	$ 863.03	$ 3,768.19	$ 845.22	$ 3,731.06	$ 827.89	$ 3,694.77
5	6,690	$ 815.14	$ 4,583.34	$ 792.79	$ 4,523.85	$ 771.19	$ 4,465.96
6	6,656	$ 769.89	$ 5,353.23	$ 743.59	$ 5,267.44	$ 718.36	$ 5,184.31
7	6,621	$ 727.13	$ 6,080.36	$ 697.42	$ 5,964.86	$ 669.12	$ 5,853.43
8	6,587	$ 686.73	$ 6,767.09	$ 654.11	$ 6,618.97	$ 623.24	$ 6,476.68
9	6,553	$ 648.55	$ 7,415.64	$ 613.46	$ 7,232.43	$ 580.50	$ 7,057.18
10	6,519	$ 612.48	$ 8,028.12	$ 575.33	$ 7,807.76	$ 540.67	$ 7,597.84
11	6,484	$ 578.40	$ 8,606.52	$ 539.55	$ 8,347.31	$ 503.56	$ 8,101.40
12	6,450	$ 546.20	$ 9,152.72	$ 505.99	$ 8,853.30	$ 468.98	$ 8,570.38
13	6,416	$ 515.78	$ 9,668.50	$ 474.49	$ 9,327.79	$ 436.76	$ 9,007.14
14	6,381	$ 487.04	$ 10,155.54	$ 444.95	$ 9,772.74	$ 406.75	$ 9,413.89
15	6,347	$ 459.89	$ 10,615.42	$ 417.23	$ 10,189.97	$ 378.79	$ 9,792.68
16	6,313	$ 434.23	$ 10,212.29	$ 391.23	$ 9,743.84	$ 352.74	$ 9,308.06
17	6,278	$ 410.00	$ 10,622.29	$ 366.84	$ 10,110.68	$ 328.47	$ 9,636.53
18	6,244	$ 387.11	$ 11,009.40	$ 343.96	$ 10,454.63	$ 305.86	$ 9,942.39
19	6,210	$ 365.48	$ 11,374.89	$ 322.49	$ 10,777.12	$ 284.80	$ 10,227.19
20	6,175	$ 345.06	$ 11,719.94	$ 302.36	$ 11,079.48	$ 265.18	$ 10,492.37
21	6,141	$ 325.76	$ 12,045.70	$ 283.47	$ 11,362.95	$ 246.91	$ 10,739.28
22	6,107	$ 307.53	$ 12,353.23	$ 265.76	$ 11,628.71	$ 229.89	$ 10,969.17
23	6,073	$ 290.32	$ 12,643.55	$ 249.14	$ 11,877.85	$ 214.03	$ 11,183.20
24	6,038	$ 274.06	$ 12,917.61	$ 233.56	$ 12,111.40	$ 199.26	$ 11,382.46
25	6,004	$ 258.70	**$ 13,176.31**	$ 218.94	**$ 12,330.34**	$ 185.51	**$ 11,567.97**

Click on + to expand additional analysis features for calculating Average Net Present Value

Average Net Present Value Determination

Residential & Commercial Inputs		
Gross Price	Federal Tax Rate Yr 1	25
$17,500		
Rebate (If Applicable)		
$1,000		
Cost $/Watt		
$ 3.50		

Method A	Assumes the rebate is deducted from the gross price before the tax credit is applied
Tax Credit @ 30% of Basis	$ 4,950.00
State Tax Credit (if applicable)	0%
State Tax Credit % of Basis	$ -
Net Cost after Incentives	$ 11,550.00
Average NPV	$ 780.34

Method B	Assumes the tax credit is based on gross price before rebate is deducted, tax is paid on rebate
Tax Credit @ 30% of Basis	$ 5,250.00
State Tax Credit from Above	0%
State Tax Credit % of Basis	$ -
State Income Tax Rate	0%
State Income Tax on Rebate	$ -
Net Cost after Incentives	$ 11,500.00
Average NPV	$ 830.34

☑ Residential PACE Analysis

Residential PACE Payment and Value Comparison

PV = Present Value FV = Future Value

DR = Discount Rate SIR = Savings to Investment Ratio

PACE Program Inputs		
PACE Interest Rate (Cell E15)	7%	
PACE Term Yrs (# pmts)	20	
PACE Initial Loan Amount	$11,550.00	
PACE Program Administrator		
PACE Program Calculations		
Annual Payment (FV) $	$ 1,090.24	
Total Pace Payments (FV) $	$ 21,804.77	
Total PACE Pmt (PV) $ (low DR)	$ 11,929.96	
Total PACE Pmt (PV) $ (avg DR)	$ 11,358.96	
Total PACE Pmt (PV) $ (high DR)	$ 10,834.12	SIR
PACE Pmt vs. 'PV Value' (low DR)	$ 1,817.34	1.16
PACE Pmt vs. 'PV Value' (avg DR)	$ 400.39	1.03
PACE Pmt vs. 'PV Value' (high DR)	$ 733.85	1.07

SIR = [Estimated savings over the life of the assessment, discounted back to present value using an appropriate discount rate] divided by [Amount financed through PACE assessment]

From DOE Guidelines for Financing PACE Piloe Programs - May 7,2010

Available at: http://www1.eere.energy.gov/wip/pdfs/arra_guidelines_for_pilot_pace_programs.pdf

Click on - to hide additional analysis features for calculating Average Net Present Value