

## Six-State Solar Home Paired-Sales Analysis

### In-depth appraisals confirm the value rooftop solar adds to U.S. homes

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#### Overview

Installation of rooftop solar photovoltaic (PV) systems has soared recently, reaching almost 600,000 properties at the end of 2014—with the help of government incentives, innovative financing options such as leased PV, and plunging PV prices. Most of these PV properties are homes. Appraising home PV systems, however, is complex, and data are rarely adequate to provide accurate PV premium estimates. In some markets this is due to the lack of comparable PV home sales. If a lender's underwriter requires that the sales-comparison approach use the sale of a similar property with a PV system, and such a comparable sale is unavailable, this can result in zero value assigned to the PV system. Such a requirement is an individual lender's underwriting guideline, not a secondary mortgage market (Fannie Mae, Freddie Mac, Federal Housing Administration, or Department of Veterans Affairs) guideline.

Several studies have shown PV systems add value to homes, but only a few were written by real estate appraisers using standard appraisal methods. The other studies used large-scale statistical analyses. Although researchers prefer such approaches, many appraisers and their lending clients prefer paired-sales techniques. Their reasons include lack of familiarity with the statistical methodology, inability to access data for the hundreds of sales or more needed for the large-scale analysis, and the known suitability of paired-sales methods for analyzing the price drivers for a single home. To bridge this gap, an experienced appraiser teamed up with a researcher from Lawrence Berkeley National Laboratory. The resulting first-of-its-kind analysis compares in-depth PV home valuation by local appraisers to statistically derived PV premiums for the same homes. Both approaches produced similar premium results, providing additional strong evidence that PV adds value to homes in a variety of markets.

#### Data and Methods

The study used appraisal methods to evaluate sales-price premiums for host-owned PV systems on single-unit detached houses in seven areas within six states, most of which were also analyzed in a recent statistical study: the San Diego metro area, Gulf Coast of Florida, Baltimore metro area, Raleigh metro area (North Carolina), Portland and Bend metro areas (Oregon), and southeast portion of Pennsylvania. Ninety-percent of sales took place between 2011 and 2013, and all the PV systems were less than 12 years old.

Seven appraisers were selected to analyze these data based on their knowledge of the local markets, access to multiple listing service data, and experience with PV sales. These appraisers developed 43 home-sales pairs (pairs of comparable PV and non-PV homes) across the seven areas. Contributory-value estimates also were generated for comparison based on gross cost (PV cost before federal, state, and utility incentives), net cost (PV cost after incentives), and income (value of energy savings from PV systems, calculated using the PV Value® tool). See the full study for more detail on methods, data, and caveats.

This fact sheet summarizes the full report: Adomatis, S., and B. Hoen. 2015. *Appraising Into The Sun: Six-State Solar Home Paired-Sales Analysis*. Berkeley, CA: Lawrence Berkeley National Laboratory. The full report, along with a summary slide deck and data file, is available [here](#) or via [emp.lbl.gov/reports](http://emp.lbl.gov/reports).

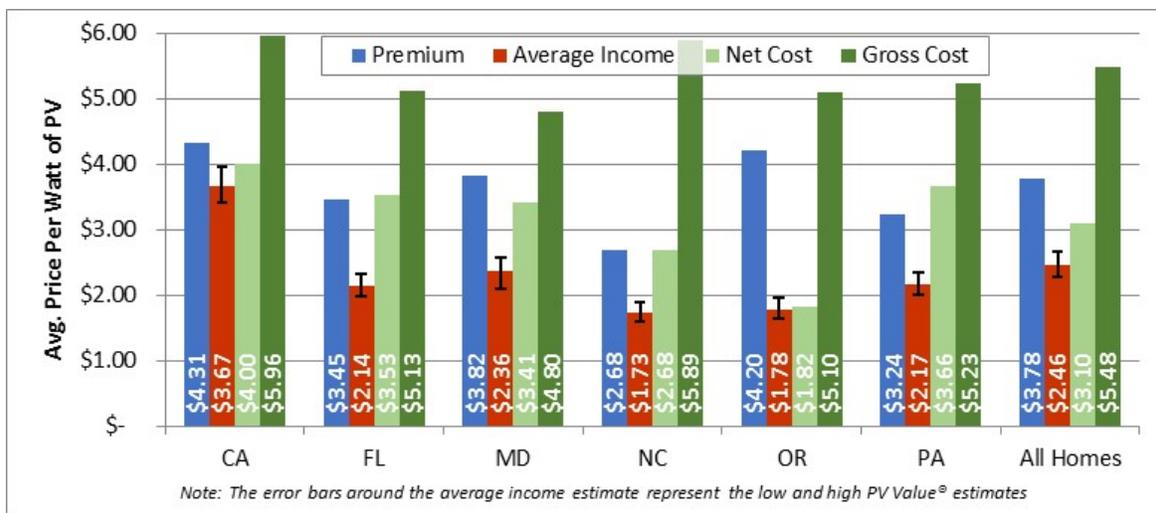
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## Results and Conclusions

- After screening for various comparability criteria, appraisers were left with only 20% of the study's original pool of 208 PV home sales. This highlights the difficulty of conducting comparable-sales analysis on PV homes. Lending appraisal guidelines and expectations should align with this reality and allow other forms of premium estimates (such as income and cost) when sales are not available.
- PV systems garnered premiums of \$2.68/W to \$4.31/W across states, averaging \$3.78/W or about \$14,000 for an average-size (3.8-kW) PV system that would have sold in 2011 (Figure 1).
- PV location, age, size, and efficiency must be considered along with local trends such as retail electricity rates and prevailing incentives to generate a credible value for a specific PV system and home.
- Price per watt is the appropriate metric for valuing PV systems, not the premium as a percentage of the home sale price, which varies widely by the size of PV systems and the price range of homes.
- PV premiums were most similar to net PV cost estimates and differed greatly from gross cost estimates.
- PV premiums were higher than PV Value® income estimates in all areas, but the premiums and income estimates were statistically correlated (they moved in the same direction). The PV Value® tool is useful because it is unlikely to overvalue PV systems, and the required data are relatively easy to collect.
- The paired-sales results accord with the statistical results, which imparts confidence in both methods.
- No consistent difference in days on the market was found between PV homes and non-PV homes.

The study also recommends ways to improve PV home valuation: improving the availability of PV home documentation and PV net cost data, providing PV system details in searchable home listings, educating the real estate and PV industries, and enabling access to utility rate, discount rate, and PV system output data.



**Figure 1. Average Paired-Sale PV Home Premiums and Contributory-Value Estimates (\$/W)**

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