

# ***Recent Solar Home Valuation Research & News***

Ben Hoen, Lawrence Berkeley National Laboratory




**ACEEE  
National Symposium  
on  
Market Transformation  
April 21st, 2015**



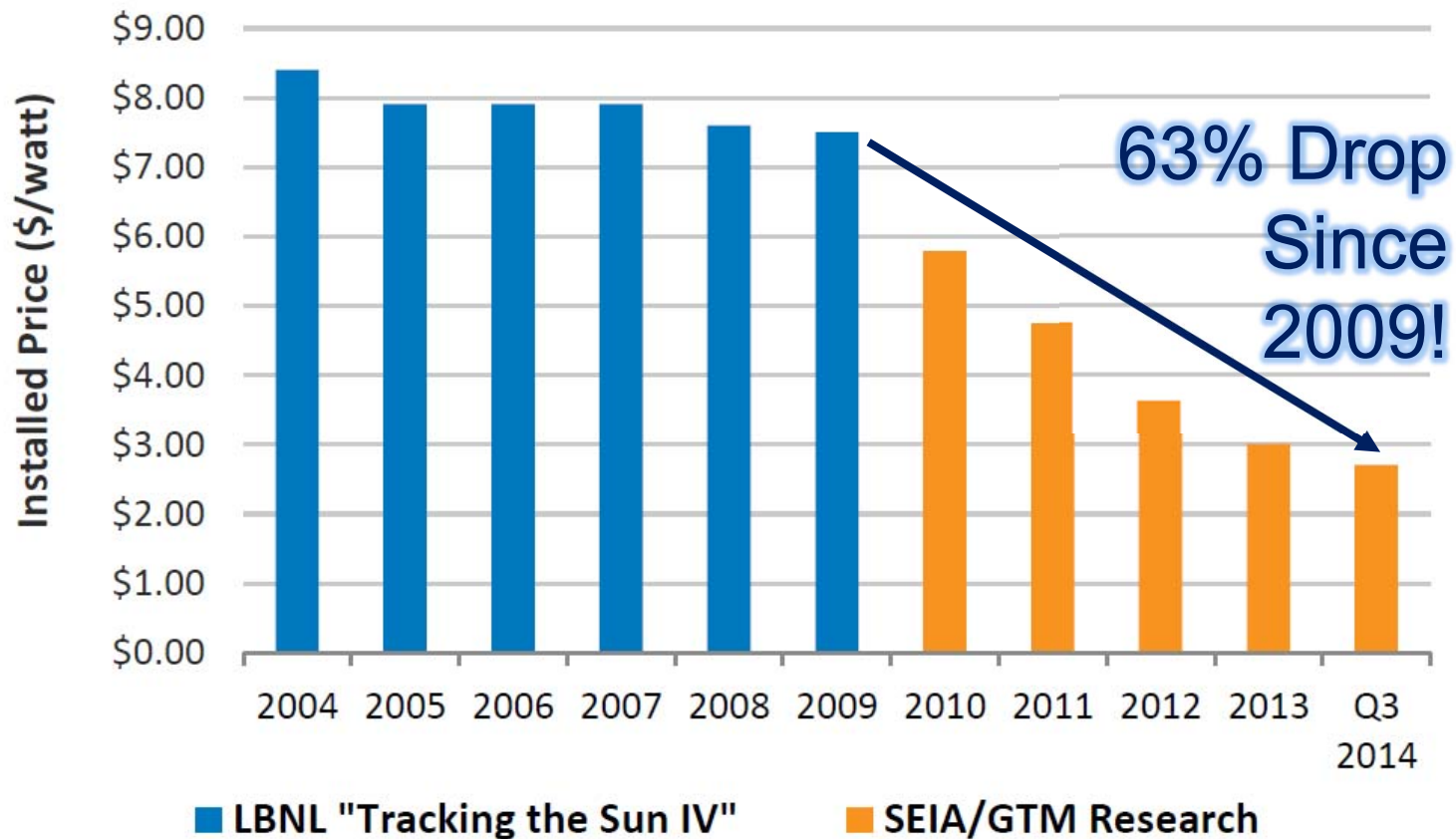
# Agenda

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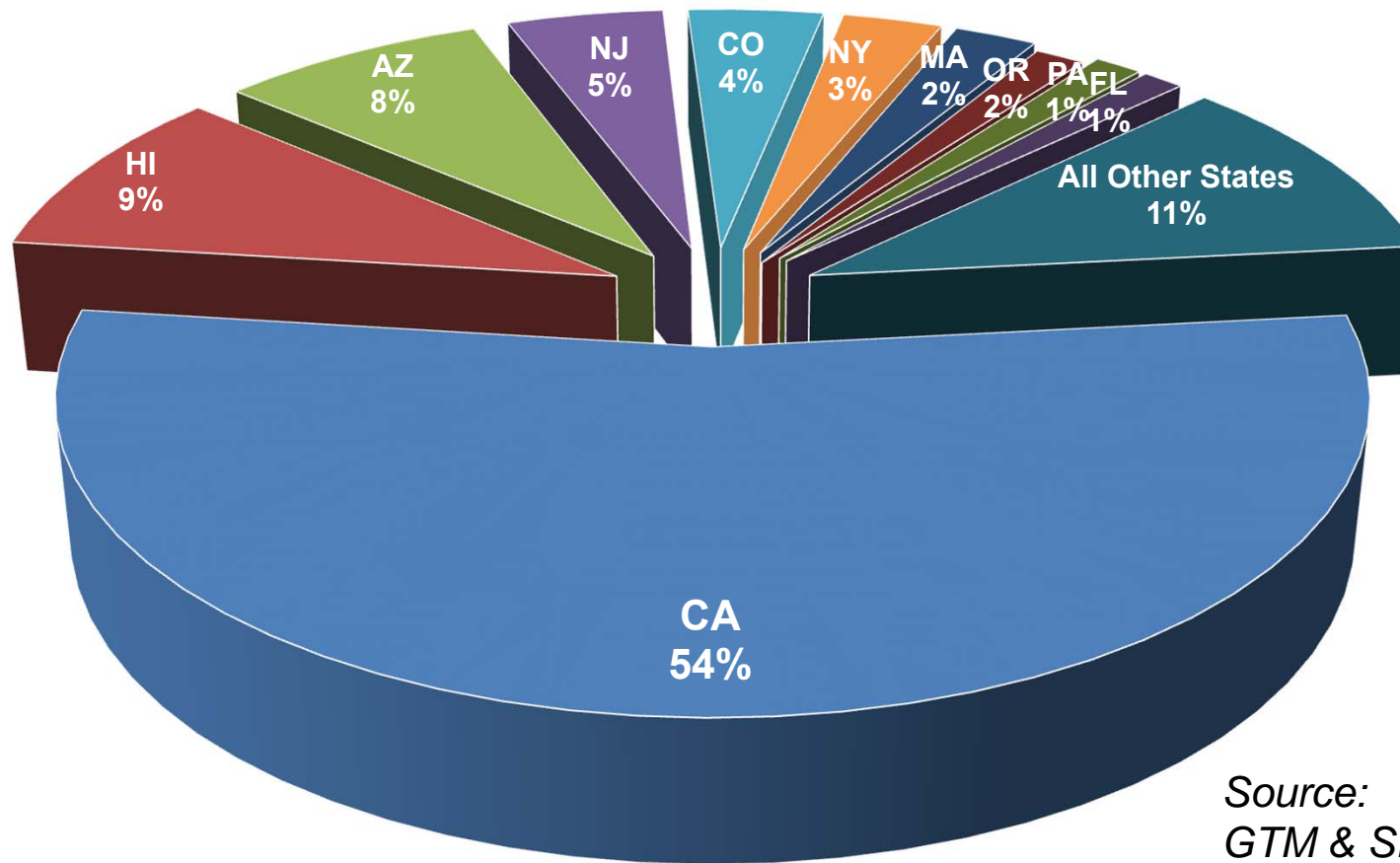
- Background on PV Market 
- New Research on PV Premiums
- Progress on Valuing PV Homes

# PV Is More Affordable Than Ever

## Average PV System Gross Installed Costs



# Almost 600,000 US Residential Installations Through 2014



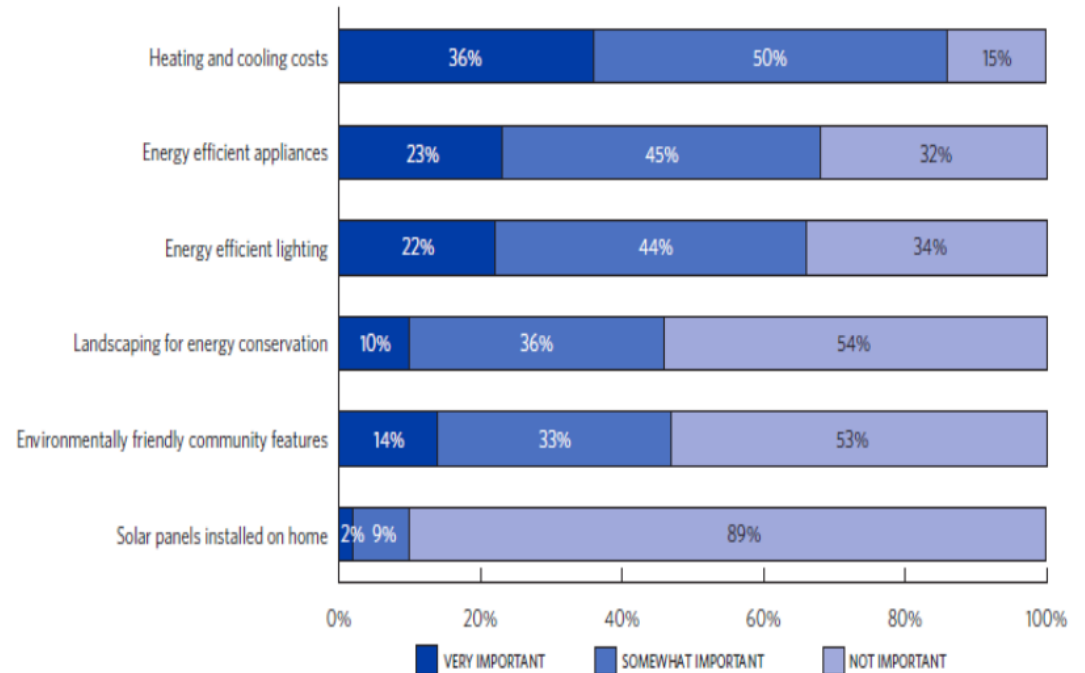
~ 50% in California, but HI, AZ, NJ and CO are growing

# Home Buyers Want Green Features In General And Solar In Particular



**EXHIBIT 2-25** IMPORTANCE OF HOME'S ENVIRONMENTALLY FRIENDLY FEATURES

(Percentage Distribution)



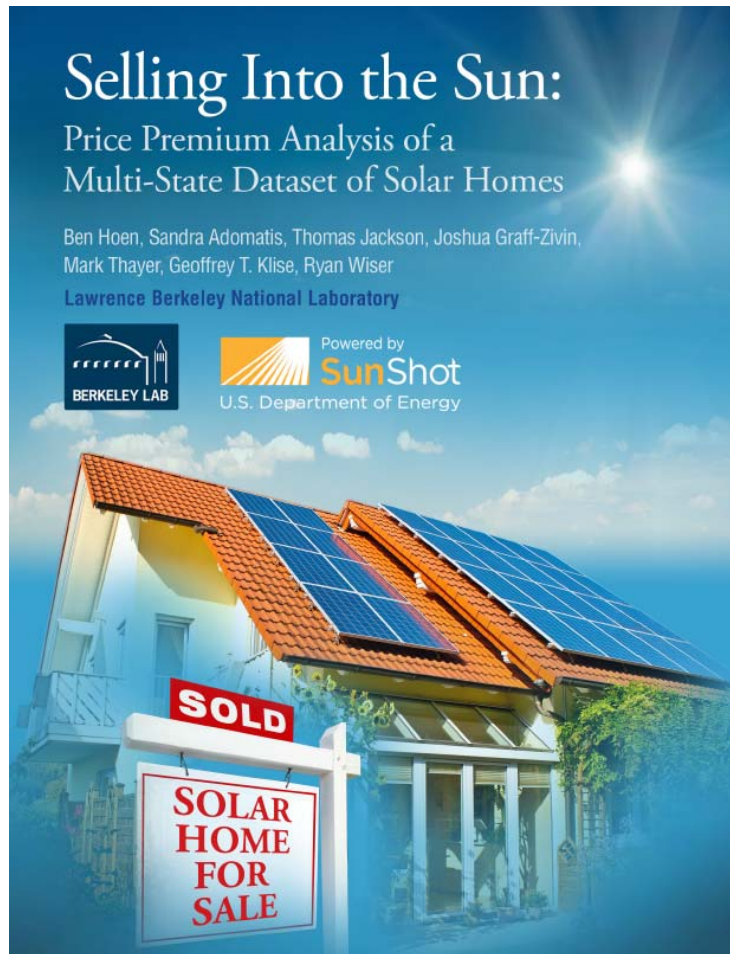
12% Say Solar Is “Important”

# But What About The Value Of The Home?

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# New Study Examines Largest Dataset Of PV Home Transactions Assembled To-Date



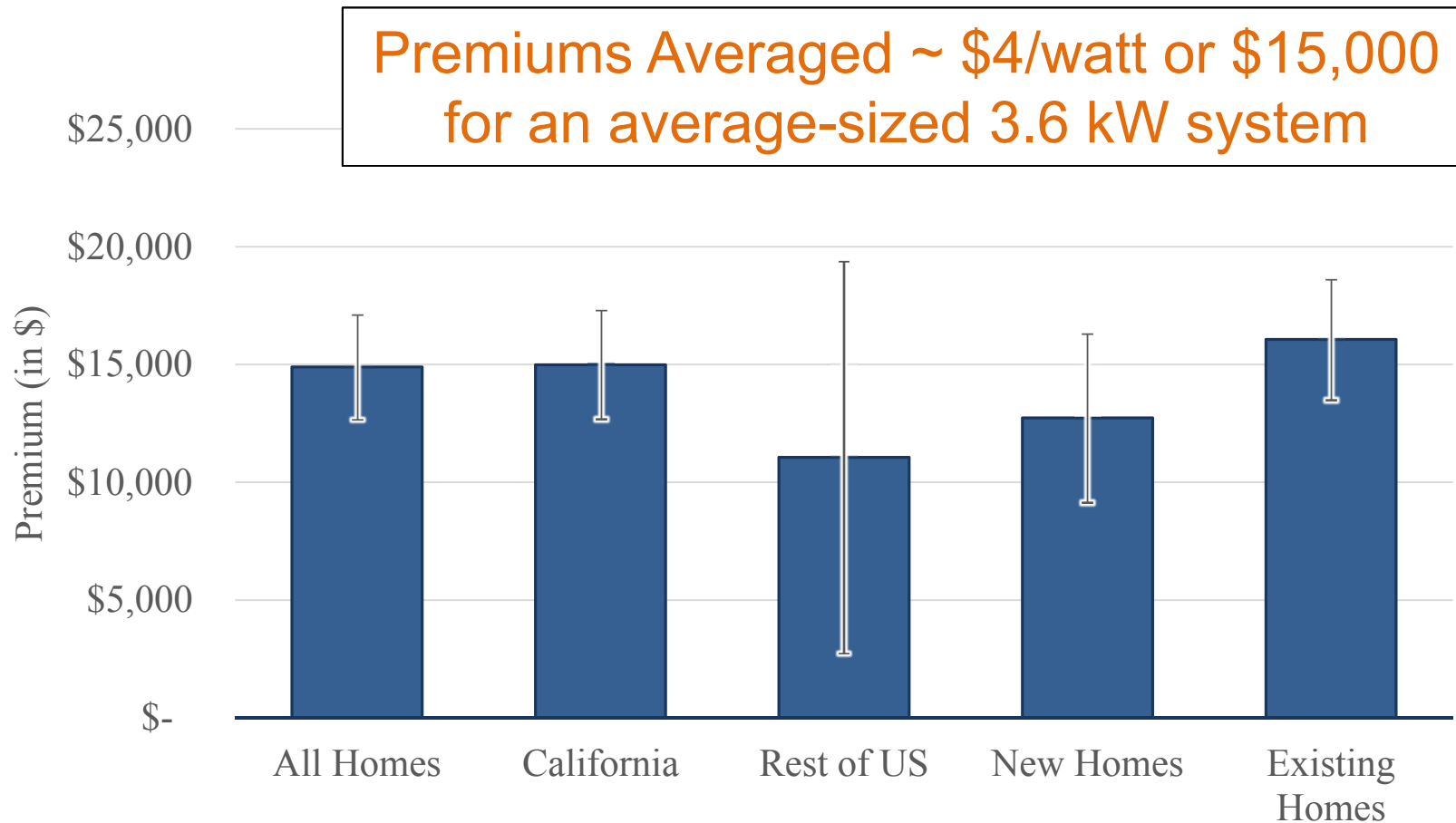
## Total 22,822 Homes

- 3,951 PV
- 18,871 Non-PV

## Spanning 12 years and 8 states

Sale Year	Non-PV Homes	PV Homes	Total
2002	107	18	125
2003	196	31	227
2004	238	53	291
2005	197	56	253
2006	348	64	412
2007	818	242	1,060
2008	1,251	453	1,704
2009	1,762	429	2,191
2010	2,751	504	3,255
2011	3,341	642	3,983
2012	3,928	694	4,622
2013	3,934	765	4,699
Total	18,871	3,951	22,822

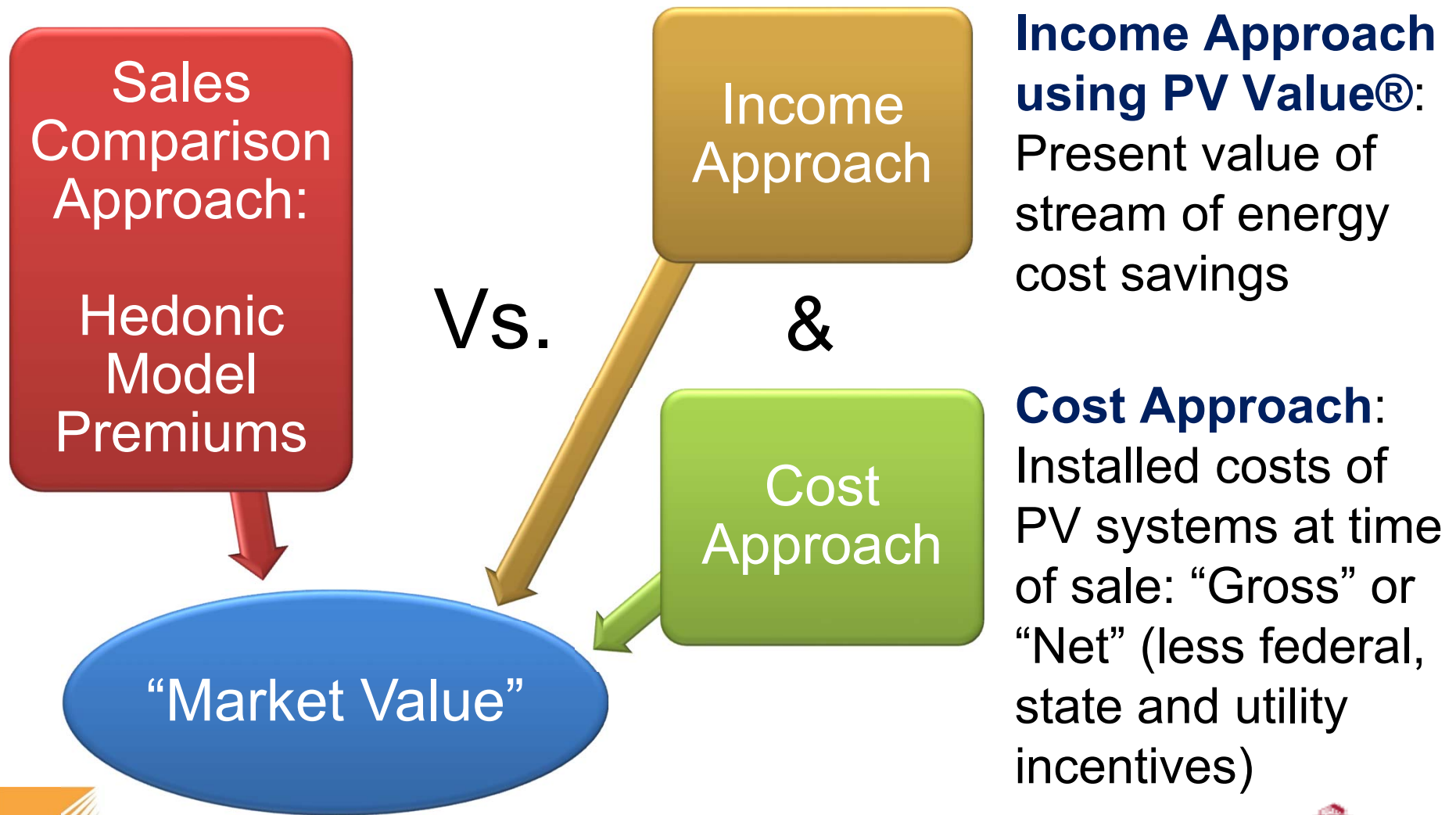
# Across All Homes & Subsets Of Homes PV Home Premiums Were Clear



*Error bars represent 95% confidence interval  
Premiums are based on an average 3.6 kW sized system*

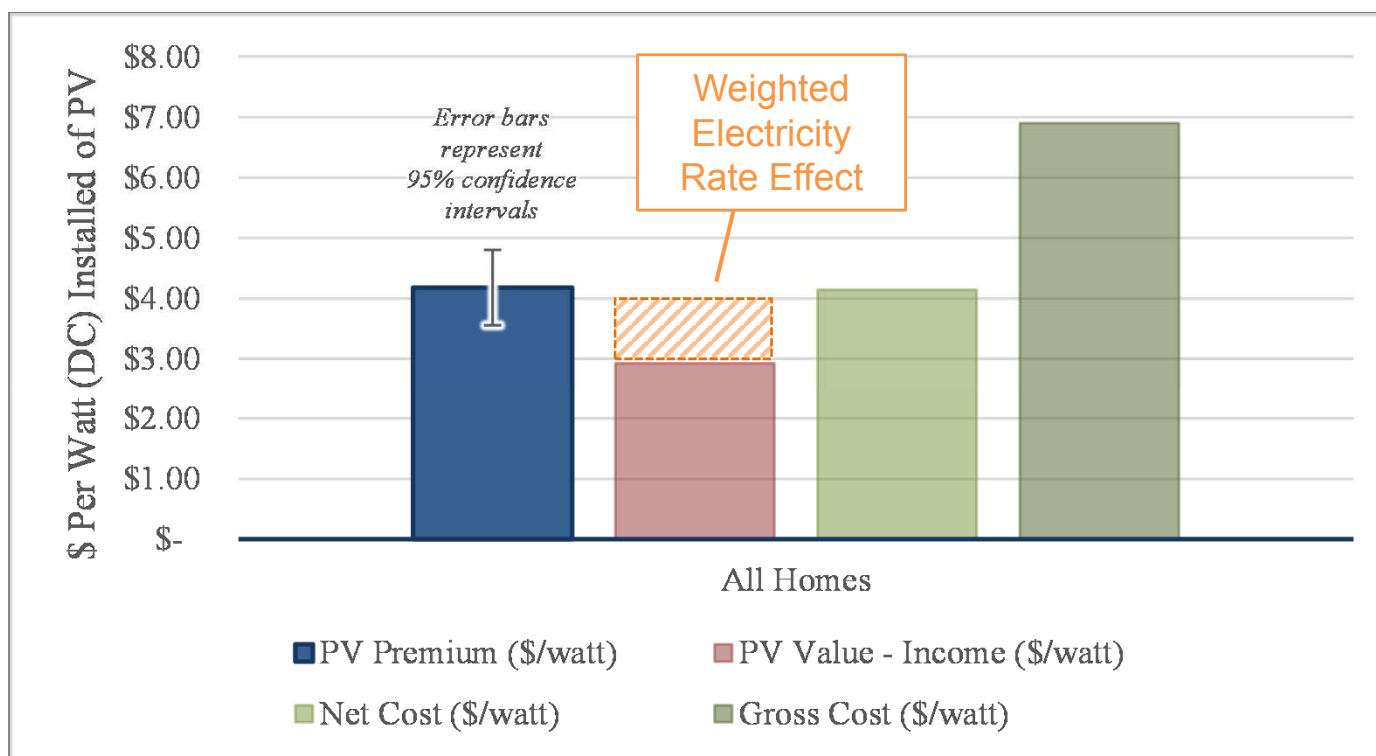


# The Study Compared PV Premiums To Income & Cost Estimates To Better Understand “Market Value”



# Premium Is Not Statistically Different From Net Cost Estimate

And is lower than the Gross Cost and higher than the Income estimates



If the Income estimate uses a weighted electricity rate, to account for California tiered rates, it falls in-line with the Premium

# Other Photovoltaic Studies Have Also Found Premiums

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- **Denver, CO. Study – Released May 2013- “The Impact of Photovoltaic Systems on Market Value and Marketability” by Lisa K. Desmarais, SRA**
  - 22 out of 30 studies reveal a sales price premium of \$1.40 to \$2.60 per Watt of installed PV
- **Oregon Study – Released May 2011- “Market-Based Investigation of Residential Solar Installation Values in Oregon” by Watkins & Associates**
  - Found premiums of \$9,800 to \$12,800
  - Results are slightly higher than net cost estimates
  - None of the homes sold for less than comparable homes

# Agenda

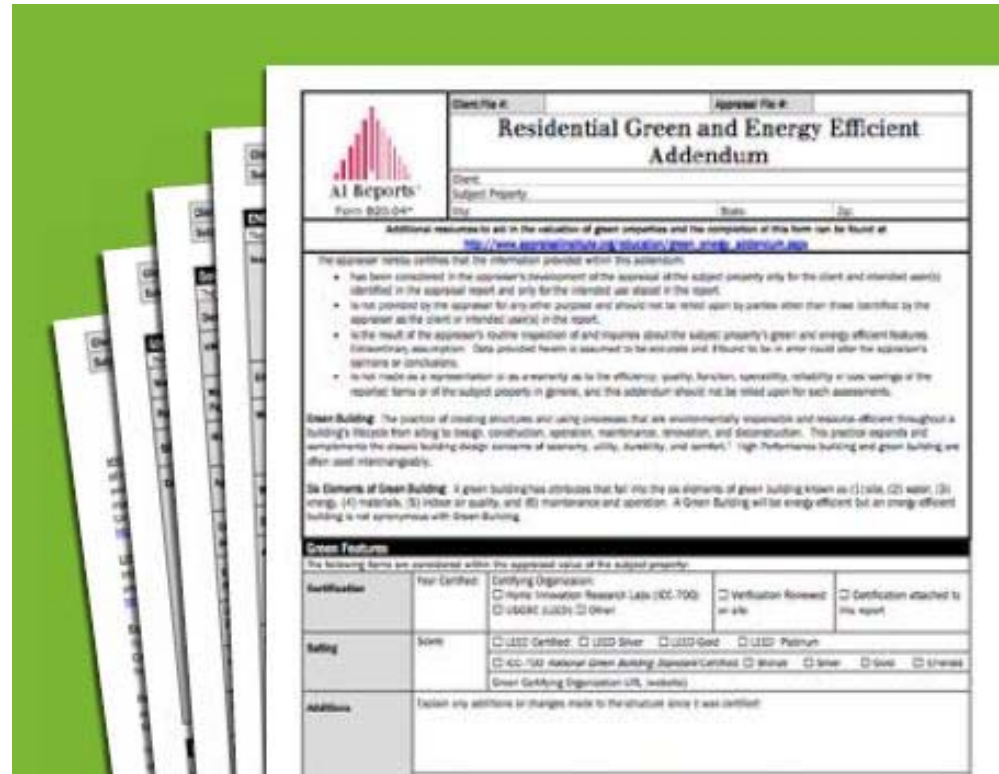
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- Background on PV Market
- New Research on PV Premiums
- Progress on Valuing PV Homes



# AI Residential Green & E.E. Addendum

- Appraisers
- Builders
- Real Estate Agents
- Energy Raters
- Sellers



The image shows a stack of forms, with the top one being the "AI Residential Green and Energy Efficient Addendum" form. The form is titled "Residential Green and Energy Efficient Addendum" and is Form 820.04. It includes fields for Client File #, Appraisal File #, Date, Subject Property, and Date. The form contains a disclaimer and a list of items to be included in the valuation of green properties. It also includes a section for Green Features, which is divided into Certification and Rating. The Certification section includes checkboxes for LEED Certified, U.S. Green Building Council (USGBC) Green Star, and other certifications. The Rating section includes checkboxes for LEED Certified, LEED Silver, LEED Gold, LEED Platinum, and other ratings. The form also includes a section for Additional comments.

The direct link for the fillable PDF "AI Residential Green and Energy Efficient Addendum" is <http://www.appraisalinstitute.org/assets/1/7/Interactive820.04-ResidentialGreenandEnergyEfficientAddendum.pdf>

# Appraisal Institute Has A Variety Of Courses To Help Appraisers Analyze Green Features

The screenshot displays the Appraisal Institute website. The header features the logo and tagline "Appraisal Institute® Professionals Providing Real Estate Solutions" on the left, and navigation links for Home, Join, Media, and Help on the right. A search bar and a phone number "Need Help? Call 888-7JOINAI (756-4624)" are also present. A "CLICK HERE TO LOGIN" button is located in the top right. Below the header is a navigation menu with categories: Membership, Find an Appraiser, Education, Publications & Store, Professional Practice, Lum Library, News & Advocacy, and About Us. The main content area shows the breadcrumb "Home > Education > Green Building Resources" and a "FONT SIZE: - +" control. The "EDUCATION" section is highlighted, featuring a green banner with a house icon and the text "Analyze the Value of Going Green with Appraisal Institute Resources". Below this banner are five green buttons: Welcome, Classroom Education, Online Education, Publications & Podcasts, and Webinar Recordings. A left sidebar lists various education resources such as "Find Education Programs", "State Approvals", and "Appraisal Forms and Resources".

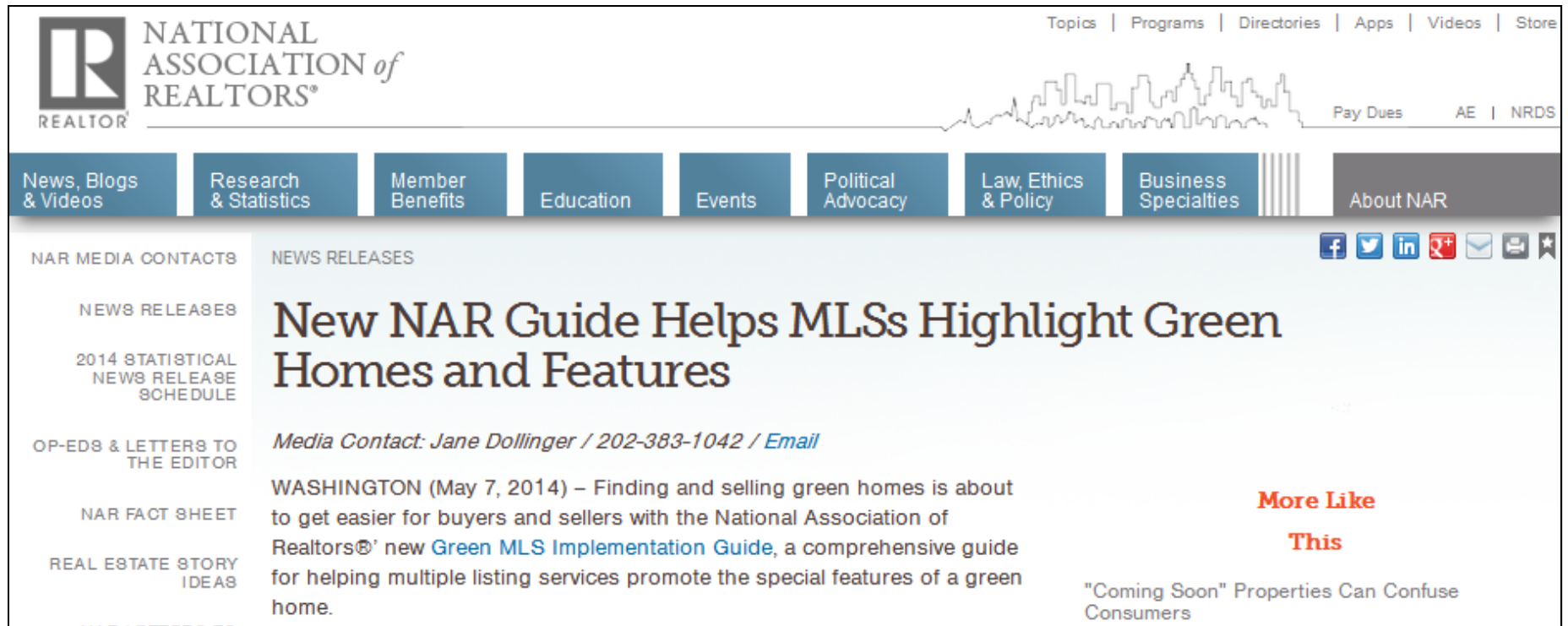
[www.appraisalinstitute.org](http://www.appraisalinstitute.org)

# A National PV Valuation Tool Is Available And Has Been Endorsed By The Appraisal Institute

The screenshot displays the PV Value® web application interface. At the top, there is a navigation bar with the PV Value® logo, 'Valuation Wiki', 'View Profile', and a user greeting 'Hi Ben!' with a 'Logout' button. The main heading is 'PV Value®'. Below this is the 'Property Information' section, which includes a search bar and a prompt: 'Please select or input the following'. The form contains several dropdown menus: 'Property Type' (with '-- Select Property Type --'), 'PV Project Type' (with '-- Select PV Project Type --'), 'PV Ownership' (with '-- Select PV Ownership Type --'), and 'State' (with '-- Select State / Territory --'). There is also a text input field for 'Zip Code / 5 digits' with the placeholder '5 digit zip code'. A green 'Submit Property Information' button is located at the bottom of the form.

pvvalue.com

# NAR Helped Develop And Promote MLS Fields To Capture Green Features



The screenshot shows the National Association of Realtors (NAR) website. The header includes the NAR logo and navigation links for Topics, Programs, Directories, Apps, Videos, and Store. Below the header is a navigation bar with categories like News, Blogs & Videos, Research & Statistics, Member Benefits, Education, Events, Political Advocacy, Law, Ethics & Policy, Business Specialties, and About NAR. The main content area features a news release titled "New NAR Guide Helps MLSs Highlight Green Homes and Features". The release is dated May 7, 2014, and discusses the "Green MLS Implementation Guide". A sidebar on the left lists various NAR resources, and a "More Like This" section is visible on the right.

NATIONAL ASSOCIATION of REALTORS®

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OP-EDS & LETTERS TO THE EDITOR

NAR FACT SHEET

REAL ESTATE STORY IDEAS

NEWS RELEASES

## New NAR Guide Helps MLSs Highlight Green Homes and Features

*Media Contact: Jane Dollinger / 202-383-1042 / Email*

WASHINGTON (May 7, 2014) – Finding and selling green homes is about to get easier for buyers and sellers with the National Association of Realtors®' new [Green MLS Implementation Guide](#), a comprehensive guide for helping multiple listing services promote the special features of a green home.

**More Like This**

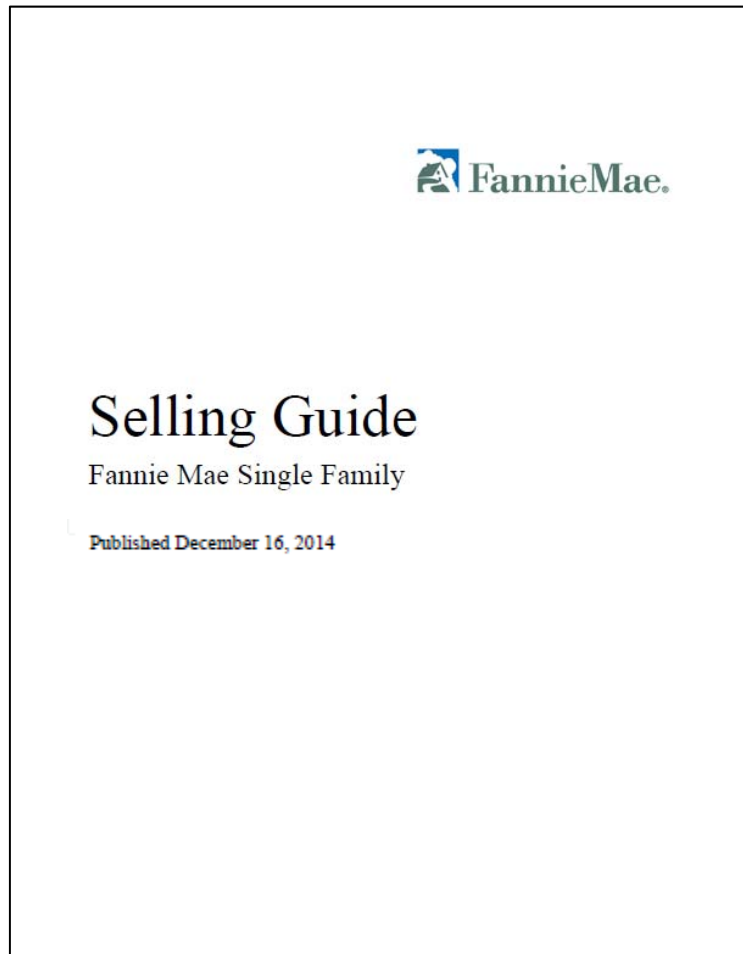
"Coming Soon" Properties Can Confuse Consumers

[www.realtor.org](http://www.realtor.org)



# Fannie Mae Recognizes Solar's Value IF Property Owner Owns The System

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“Fannie Mae will purchase or securitize a mortgage loan on a property with solar panels.”

“If the property owner is the owner of the solar panels, standard eligibility requirements apply (for example, appraisal, insurance, and title).”

“If the solar panels are leased...The solar panels may not be included in the appraised value of the property.”

# HUD's FHA Also Recognized Solar's Value In Insurable Mortgage Limit

FHA Single Family Housing Policy Handbook  
Table of Contents

1	FHA Single Family Housing Policy Handbook	
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30	(b) Form HUD-92900-A Part IV: Borrower Consent for Social Security	
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34	Privacy Act.....	7
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November 5, 2013 i

## Solar Energy Systems

“A mortgagee may add the cost of a solar energy system to the mortgage up to 20 percent above than the maximum insurable mortgage limit.”

“Costs for new solar systems may be added to an FHA-insured base mortgage, for the following Sections of the Act and transaction types:

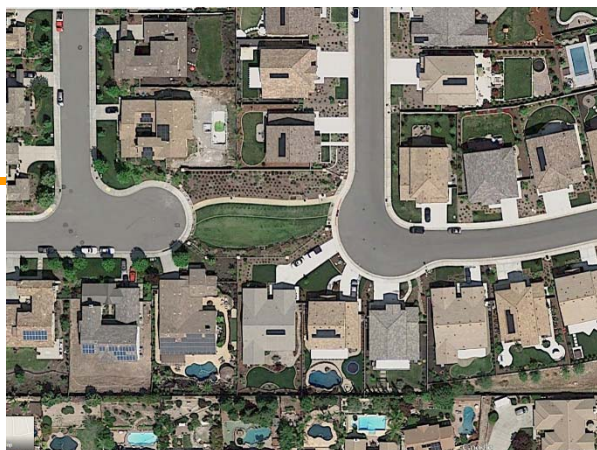
- Purchase Transaction
- Rate and Term Refinances and Simple Refinance”



Research shows that homes with solar energy systems can sell for **more money** than homes without solar, and institutional support is increasing for that valuation.



Learn More About Solar and Find Resources for Homebuilders at [energy.gov/eere/sunshot/homebuilders](https://energy.gov/eere/sunshot/homebuilders)



# Thank You



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# Additional Slides

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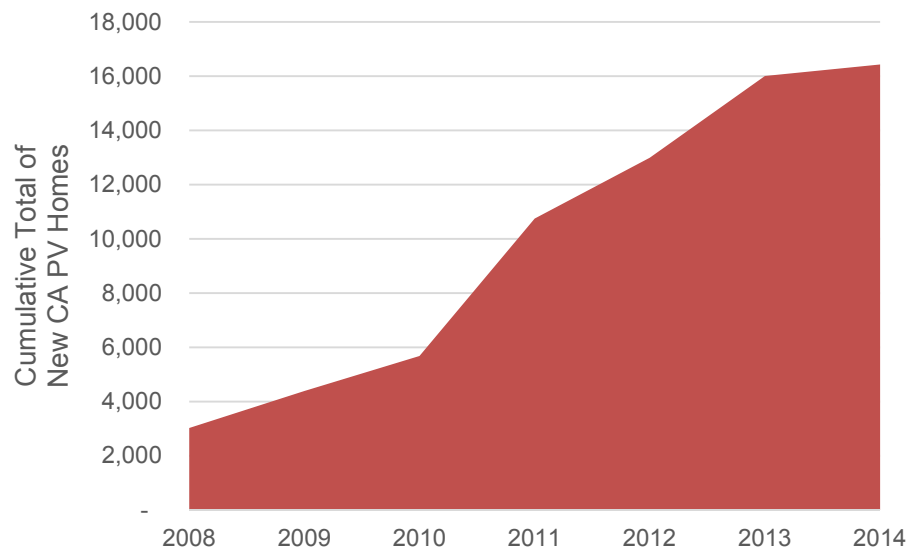
# PV (and EE) Features Can Increase Sales Velocity

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- “Some CA home builders...have found accelerated home sales, and improved customer satisfaction.”  
*Dakin, Springer & Kelly, 2008*
- “*New homes with solar sell twice as fast as comparable non-PV homes*”  
*SunPower, 2008*

# New PV Home Growth Steady But Much Slower Than Existing Homes

- Roughly 5% of all CA installations over the last 12 years have been on new homes.
- In California, there are ~ 16,400 new homes with PV installed



Source: NSHP, 2015