

# Solar Powering Your Community Association



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# About the SunShot Solar Outreach Partnership



The SunShot Solar Outreach Partnership (SolarOPs) is a U.S. Department of Energy (DOE) program designed to increase the use and integration of solar energy in communities across the US.

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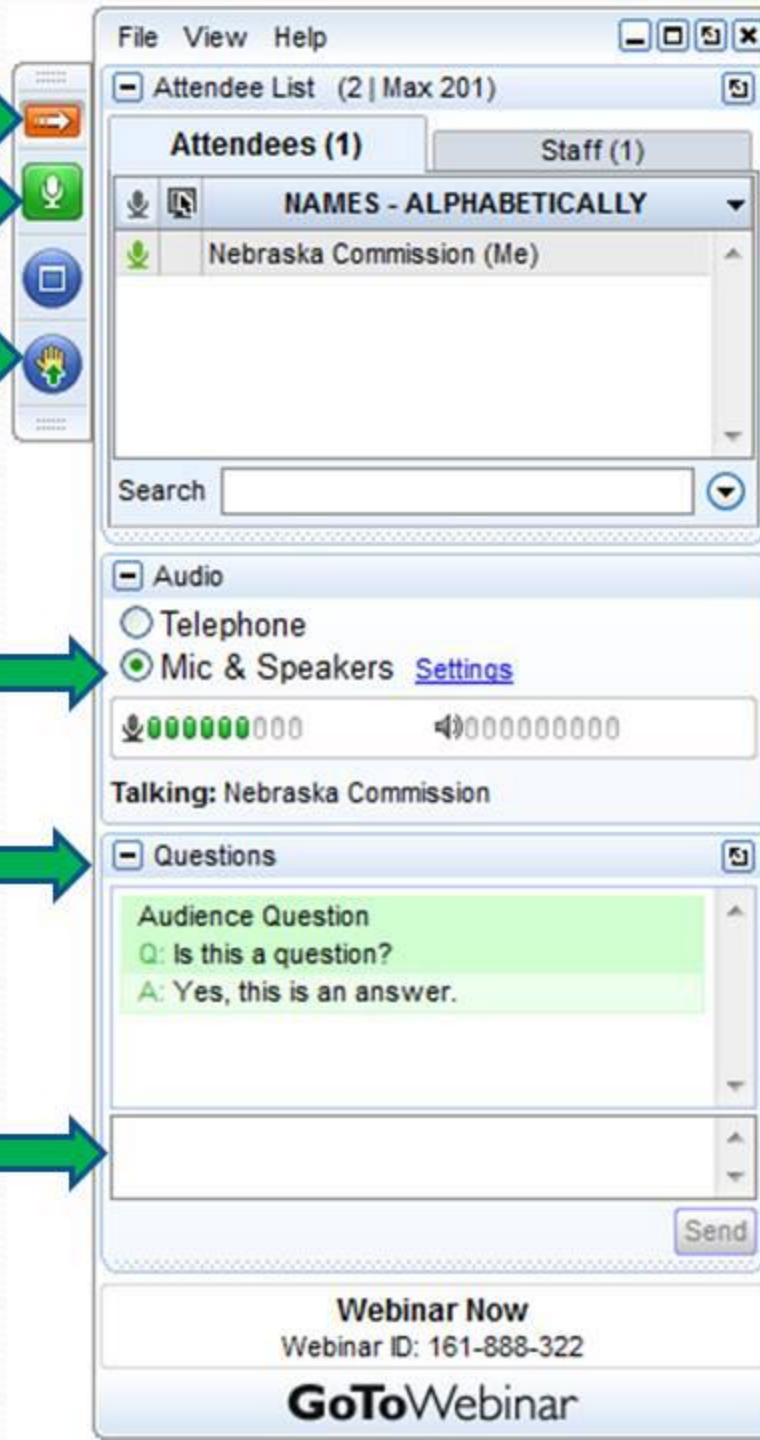
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# Speakers

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- Chad Tudenggongbu, ICLEI – Local Governments For Sustainability
- Phillip Haddix, The Solar Foundation
- Mary Kurkjian, High Desert Residential Homeowner Association in Albuquerque, NM
- Bill Brooks, Brooks Engineering



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# **Philip Haddix**

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# Overview

## A Beautiful Day in the Neighborhood

Encouraging Solar Development through Community Association Policies and Processes

*Prepared by*

THE  SOLAR FOUNDATION  
*Research and Education to Advance Solar Energy*

*For*

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U.S. Department of Energy



## Audience:

HOA boards and architectural review committees

## Recommendations:

- Educate
- Clarify
- Coproduce

Nearly **26 million** U.S. housing units are governed by **Community Associations**<sup>1</sup>

That's almost **20%** of all housing in the nation.<sup>2</sup>

### Homeowners Associations

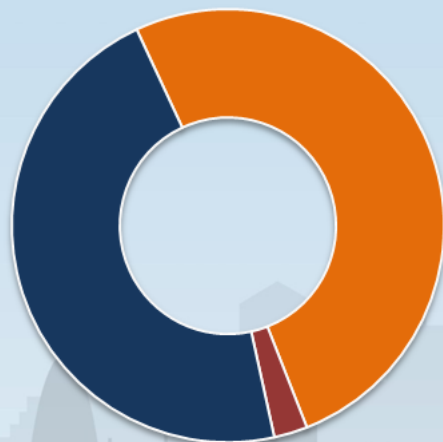
[ 13.2 million ]

### Condominiums

[ 12 million ]

### Cooperatives

[ 650 thousand ]



Adding solar to only **5%** of HOA units



would create

**3.3 gigawatts** of new solar capacity.

This is as much solar as was added in the **entire United States** in 2012.<sup>3</sup>

~ Read more in The Solar Foundation's new report on HOAs and solar: <http://bit.ly/187rCd3> ~

[1] Community Associations Institute. *Industry Data*. [www.caionline.org/info/research/Pages/default.aspx](http://www.caionline.org/info/research/Pages/default.aspx)

[2] 2011 American Housing Survey. [www.census.gov/housing/ahs/data/national.html](http://www.census.gov/housing/ahs/data/national.html)

[3] Greentech Media and Solar Energy Industries Association. *U.S. Solar Market Insight: 2012 Year-in-Review*. [www.seia.org/research-resources/us-solar-market-insight-2012-year-review](http://www.seia.org/research-resources/us-solar-market-insight-2012-year-review)

\* Analysis assumes a 5kW solar energy system for each solarized home.

# Benefits of Solar Energy

- Local Economy Growth
- Local Jobs
- Environmental Quality
- Energy Independence
- Stabilizes Price Volatility
- Valuable to Utilities





# Benefit: Home Property Values

From NREL:

Solar homes sold

**20% faster**

and gained

**17% more value**

than the equivalent non-solar homes  
in surveyed California subdivisions

# Solar and HOAs

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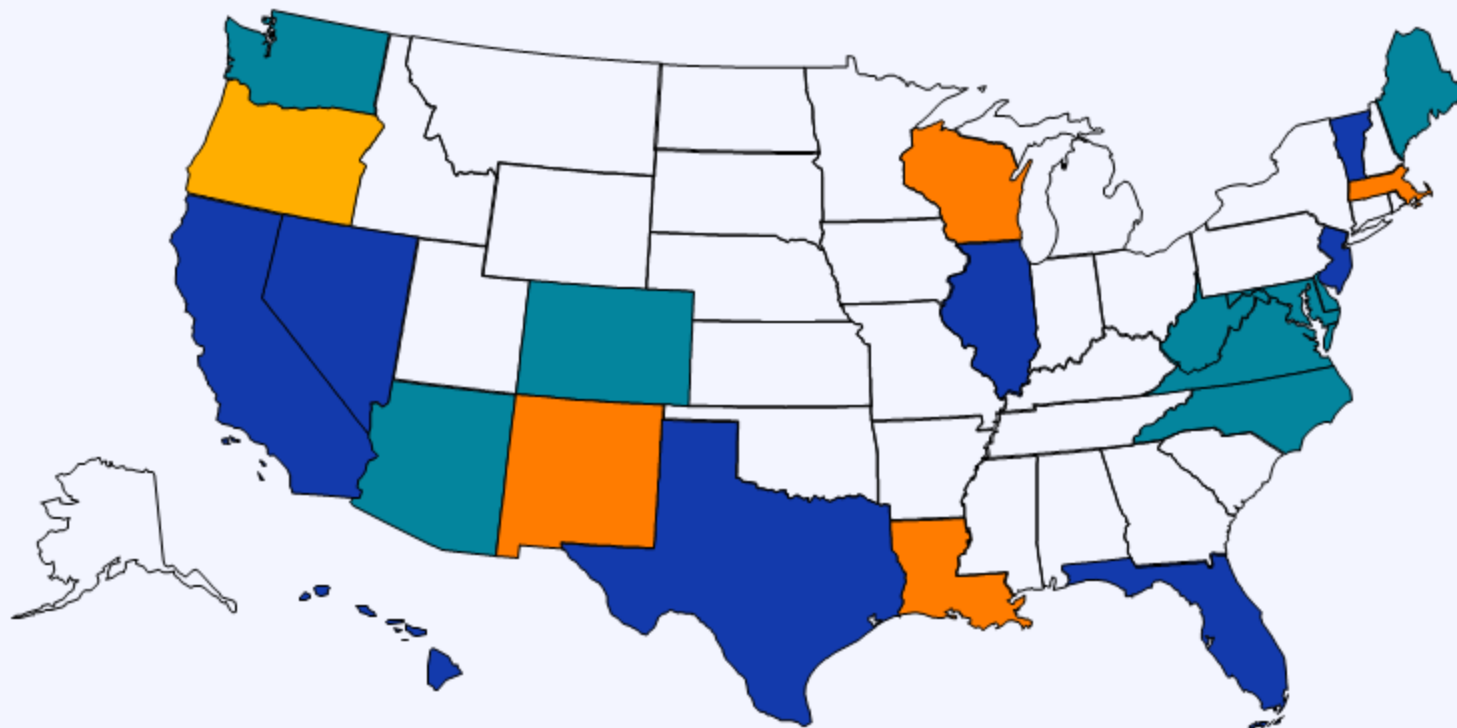
## Motivations to Restrict

Community Aesthetics

Tree Preservation and Planting

Health and Safety

# Context: Solar Rights Provisions



- Type I: No Limits on Restrictions
- Type II: Undefined "Reasonable" Restrictions
- Type III: Qualified "Reasonable" Restrictions
- Type IV: Quantified Restrictions

# Context: Solar Rights Provisions

## Placement/ Visibility

- Front roof plane (vs. back/sides)
- Visible from street/ property lines?
- Screening requirements
- Module tilt

## Health/ Safety

- Reference to building and electrical codes adopted by state

## Orientation (Azimuth)

- Within x degrees east or west of due south

## Size

- Percent of total roof area

## Aesthetics

- Color of module frame/ balance of system components

# Recommendation #1: Educate

## Impact of Restrictions

### ■ Solar as an **investment**

#### Cost

- + Installed Cost
- + Maintenance
- Direct Incentive

#### Benefit

- + Avoided Energy Cost
- + Excess Generation
- + Performance Incentive



# Recommendation #2: Clarify

## Need to Clarify

### Complex Application Process

- Residents unsure of application requirement/process and other document submittals (e.g., drawings, pictures, plans, system specifications)

### Unclear Design Requirements

- Unclear or unstated design criteria creates an informational barrier; can cause homeowners to reapply or appeal previous decisions made according to ambiguous restrictions, increasing transaction costs
- **Georgia Example**

### Awareness

- Ensure homeowners are aware of the existence of any restrictions and make these guidelines readily available

# Recommendation #2: Clarify

## *Example:*

**Solar Collectors.** The construction of solar energy collector panels and attendant hardware is subject to Architectural Review and Use Committee approval. An application for solar collectors should include detailed plans and specifications. If a commercial product is to be installed, the manufacturer's specifications and promotional literature or photographs of similar installations should be provided with the application. A solar collector installation must also meet all [town] requirements.

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# Recommendation #2: Clarify

## *Better Example:*

Solar panels shall be placed so as to cause minimum visual impact on surrounding residences. Unless the panels would be otherwise inoperable due to shade, panels should be placed on the rear roof of a home. Panels should be centered laterally on the highest roof area and located near the ridge line. Panels should be far enough from the ridge line that they do not protrude above the house outline when viewed from adjacent properties. Panels should be of the same size and shape and placed together...[t]he collector surface should be parallel to the roof...Pipes, wires, and mounting hardware must be unobtrusive...When allowed, panels mounted to the front side of the roof must be flush with the roof



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# Recommendation #3: Coproduce

## Engage Community Members and Stakeholders

- Community Developer
- ARC
- Community Owners
- Solar Contractors
- Professional Arborist or Urban Forester
- Solar Access Legal Expert
- Knowledgeable Facilitator
- Local Code Officials
- Historical Preservation Expert

# The Experience of High Desert HOA (Albuquerque, NM)



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# One Community's Approach to Solar Installations in an HOA

Mary Kurkjian  
High Desert Residential HOA  
Albuquerque, NM  
July 31, 2013



# High Desert HOA Overview

- 1000 acres with 1600 homes in City of Albuquerque, NM
  - 240 acres remain open space
- Master Planned Community established in mid-1990's on beautiful open space land at the foot of the Sandia Mountains
  - Former Spanish land grant territory
  - Wide ranging home values and considered one of the nicest neighborhoods in Albuquerque
- Architectural requirements called “Guidelines for Sustainability”



# What started the solar guidelines?

- 2009 – first solar installations pop up. UGLY!
- 2010 – Members ask why are these solar installations being allowed when they don't seem to fit the Guidelines?
  - Initial answer: Because we can't impose controls, citing New Mexico statute (NMSA 1978, Sec. 3-18-32)
- Nov 2010 – Board established a “Solar Task Force” to address the issue

# Solar Task Force

- Task Force Members: all owners
  - 1 lawyer, 1 policy analyst, 2 resident owners with solar (2 were Board members)
  - plus 1 law student as a consultant
- Two tasks:
  - Board policy statement
  - Modifications to the architectural guidelines
- Upon advice of the Association's lawyer the policy statement effort was dropped
  - Pro: makes it clear we support solar despite restrictions
  - Cons: interferes with our governance process; saying too much can be used against you

# Process for Guidelines Changes

- **Nov 2010** - Solar Task Force began to draft changes to architectural guidelines for “mechanical/electrical equipment”
  - Association members provided technical assistance as required
  - Jan – Mar 2011 pause: Legislative session considered bill to prohibit any HOA or municipal restrictions. Bill died.
- New Construction Committee (NCC), owner of the Guidelines, reviewed and modified drafts
- Input sought from Board, Voting Members and general membership
  - Open comment period not required but conducted
- Legal review by Association attorney
- **Oct 2011** Final version approved by the Board and adopted by the NCC
- Published to the website along with a helpful brochure for owners and vendors



# Existing Statutes

- Pre-existing law: “Solar Rights Act” NMSA 1978, Sec. 47-3-1 et seq. (enacted in 1977)
  - Established the right to use solar energy as a property right
- Pre-existing law: “Solar Recordation Act” NMSA 1978 Sec. 47-3-6 et seq. (enacted in 1983)
  - Established a procedure to register and protect one’s solar rights from future changes in adjacent property
- Pre-existing law: NMSA 1978 Section 3-18-32 (enacted in 2007)
  - “A covenant, restriction or condition contained in a deed, contract, security agreement or other instrument, effective after July 1, 1978, affecting the transfer, sale or use of, or an interest in, real property that **effectively prohibits** the installation or use of a solar collector is void and unenforceable.”
  - **2011 State Attorney General opinion #11-02 determined that restrictions are allowed as long as they do not “effectively prohibit” solar installations.**

# Considerations for Guidelines

- Consistent in tone, specificity and restrictiveness as in other mechanical equipment guidelines
- Focus on the aesthetic appearance of the solar installation
- Follow the design themes in our Guidelines:
  - Consistent with the approved architectural styles
  - Minimal visual impact / required attention to shielding
  - No reflectivity
  - Within overall building height restrictions
  - Must be within the private building envelope
- Be reasonable and don't “effectively prohibit”
  - We took note of Calif. law regarding 20% threshold, AZ case law (Garden Lakes Community Association v. Madigan) allowing a “flexible standard”, and CO law allowing “reasonable” aesthetic requirements
- Give specific guidance on submission requirements
  - What views are needed
  - Distance benchmarks
  - Shielding provisions
  - Pictures and technical specifications

# How is it working?

- High owner compliance. No complaints or push-back. No denials.
- No direct impact on requests for approval. Decrease is more due to housing market decline, energy prices, and uncertainty of tax credits.
  - 2010: 12 approvals
  - 2011: 12 approvals
    - new guidelines were unofficially implemented in mid-2011 and officially implemented in Oct 2011
  - 2012: 4 approvals
  - 2013: 2 approvals
- Solar installations are generally compliant
  - Judgments of architectural compliance made by volunteer committees
  - Not always universal agreement that installations are compliant

# Our Architectural Guidelines

## **Solar Specific Guidelines (as part of the section on Mechanical/Electrical Equipment)**

- Every attempt should be made to minimize the visual impact of solar equipment.
- For pitched roofs, the equipment should be mounted in the same plane as the roof and as close as possible to the roof.
- For flat roofs, the bottom of the equipment will be mounted as close as possible to the roof (a distance of 6 inches or less from the bottom of the equipment to the roof is desired) and at the minimum angle possible for reasonable energy production and access to the sun.
- No solar energy devices shall encroach upon the Common Area of the property or the property of another owner or be located outside of the Building Envelope of the owner's lot.
- The design and color of framing or trim on any solar energy device shall be of a non-reflective surface to minimize the visual impact. All paintable surfaces such as pipes, tubes, cables, conduits and wires, shall be screened or painted to match the colors of the underlying surfaces at the time of installation, unless doing so would be in violation of building, fire, or safety codes or the manufacturer's requirements.
- Additional shielding or painting may be required to minimize reflections from any solar energy device.
- The total installed height of the solar equipment shall conform to the building height restrictions in the applicable Guidelines.
- Plan submissions
  - Plans shall be submitted that are to scale, although dimension labeling is not required. Required views are a plan view, and views from corners and mid-points, including expected worst case views for (1) along the property line at a height of 63.5" and (2) from adjacent street centerlines from the extension of any property line in a perpendicular direction to the adjacent street at a height of 42".
  - Pitch angles relative to the flat roof or ground.
  - Distance from the lowest natural grade to the top of the solar equipment shall be specified.
  - Any shielding proposed to meet the shielding requirements shall be shown on the proposed plans.
  - A visual rendering of any associated equipment (controls, conduits, piping, etc) installed on the sides of the home shall be provided.
  - Specification sheets and dimensions for the solar equipment mounted exterior to the home shall be submitted along with the installation company.

# Our Architectural Guidelines (cont'd)

## **Additional information/discussion required for Non-Conforming Plans**

If the above conditions cannot be met for the proposed mechanical/electrical equipment or solar installation, the homeowner should be prepared to discuss the following with the committee before approval can be granted. In addition, if it becomes apparent a variance to the Guidelines is necessary, the proposal will be forwarded from the MC to the NCC for resolution.

- Possible reduction in physical size
- Performance reduction due to lower mounting angles or location change
- Additional shielding
- Different equipment that could meet the same energy generation request
- Why the locations required by the Guidelines for installation are unsuitable for providing solar energy.

*Note: These Guidelines are part of a larger set of building guidelines that govern other aspects of building, including many that pertain to mechanical equipment and utilities. Solar installations must also comply with those guidelines.*



High Desert HOA website:  
[www.highdesertliving.net](http://www.highdesertliving.net)

Solar Guidelines at:

[http://www.highdesertliving.net/highdesertliving/external.html?mode=d&xlink=downloadfile.html%3Fa%3Dsnd%26file\\_id%3D1213](http://www.highdesertliving.net/highdesertliving/external.html?mode=d&xlink=downloadfile.html%3Fa%3Dsnd%26file_id%3D1213)

Solar Pamphlet at:

[http://www.highdesertliving.net/highdesertliving/external.html?mode=d&xlink=downloadfile.html%3Fa%3Dsnd%26file\\_id%3D1226](http://www.highdesertliving.net/highdesertliving/external.html?mode=d&xlink=downloadfile.html%3Fa%3Dsnd%26file_id%3D1226)



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# **Mary Kurkjian**

Member and Chr., Solar Task Force

High Desert Residential Homeowners Association

July 31, 2013



# Advance Community Education on Solar Energy



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# Solar Energy Basics for Proper Regulation

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- Homeowner's Associations or Architectural Board must understand basics of Solar Energy in order to properly implement restrictions
- Items that impact performance
  - Array Size
  - Array Southerly Orientation
  - Array Tilt
  - System Shading

# Array Size

Figure 4: Roof Area Required for Solar Energy Systems<sup>bx</sup>

<i>Approximate Roof Area Needed in Square Feet</i>					
PV module Efficiency	Desired PV System Capacity Rating (Watts)				
	1,000	2,000	4,000	8,000	10,000
8%	150	300	600	1,200	1,500
12%	100	200	400	800	1,000
16%	80	160	320	640	800
20%	55	110	220	440	550
For example, to generate 2,000 watts from a 16% efficient module, you need 160 square feet of roof area.					

# Array Southerly Orientation

**Table 5: Impact of Orientation on System Production and Payback**

Orientation	Annual Solar Energy Production Value (\$0.1114/kWh) <sup>x</sup>	Installed Cost (\$5.04/W) <sup>xi</sup>	Cost After Federal Tax Incentives (30% ITC) <sup>xii</sup>	Simple Payback Period	Net Benefit After 40 Years <sup>xiii</sup>
South (180°)	\$666.19	\$25,200	\$17,640	27 Years	\$12,737.52
East (90°)	\$511.96	\$25,200	\$17,640	34 Years	\$4,454.46
West (270°)	\$510.51	\$25,200	\$17,640	34 Years	\$4,376.66

# Array Tilt

**Table 6: System Production Impact of Array Tilt**

<i>Array Tilt</i>		<i>Production Impacts</i>	
Roof Pitch (Rise:Run)	Roof Angle	Annual Energy Production (kWh)	% Difference from Latitude Tilt
0:12 (Flat Roof)	0°	5196	-13.1%
3:12	14°	5751	-3.8%
4:12	18°	5852	-2.1%
5:12	23°	5942	-0.6%
6:12	27°	5987	+0.2%
7:12	30°	6004	+0.4%
8:12	34°	6006	+0.5%
9:12	37°	5992	+0.2%
<i>Latitude Tilt</i>	38.8°	5978	0%

# Well Meaning Ideas (but wrong)

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- 3' tall perimeter screens around residential rooftop PV systems.
- Building-Integrated PV only
- No visual from street (unless official historic district)

# Best Practice Examples

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- Keep roof-mounted systems to limits of roof planes (no hanging over eaves or protruding above ridge)
- Either parallel with roof or no greater than 18" above roof.



# References

## Table 7: Resources and Tools on Solar Energy System Performance

### 1. *PVWatts Viewer*

#### **National Renewable Energy Laboratory**

A web-based tool that allows users to estimate system production and analyze the value of energy produced by a solar energy system.

[http://gisatnrel.nrel.gov/PVWatts\\_Viewer/index.html](http://gisatnrel.nrel.gov/PVWatts_Viewer/index.html)

### 2. *System Advisor Model (SAM)*

#### **National Renewable Energy Laboratory**

A modeling program (free to download) that allows users to predict system performance and cost of energy based on a number of real-world system design parameters.

<https://sam.nrel.gov/>

### 3. *Photovoltaic Installer Resource Guide*

#### **North American Board of Certified Energy Practitioners**

This guide, designed to help train future solar installers, provides detailed yet easy-to-understand explanations of the technical aspects of solar energy.

[www.nabcep.org/wp-content/uploads/2012/03/NABCEP-PV-Installer-Resource-Guide-March-2012-v.5.2.pdf](http://www.nabcep.org/wp-content/uploads/2012/03/NABCEP-PV-Installer-Resource-Guide-March-2012-v.5.2.pdf)

### 4. *Building America Best Practices Series: Solar Thermal & Photovoltaic Systems*

#### **U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy**

Written for home builders, this guide provides a thorough breakdown of the components of rooftop installations.

[http://apps1.eere.energy.gov/buildings/publications/pdfs/building\\_america/41085.pdf](http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/41085.pdf)

### 5. *Database of State Incentives for Renewables & Efficiency*

#### **North Carolina Solar Center at NC State University**

An extensive database of state, local, utility, and federal solar incentives and policies. Provides summaries of state solar rights provisions and links to the full text of these laws.

[www.dsireusa.org/solar](http://www.dsireusa.org/solar)



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