



CALIFORNIA ENERGY COMMISSION

Renewable Energy Program New Solar Homes Partnership



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Solar Forum, San Diego, January 29, 2007



Agenda

SB1

Historical Data & Projections

NSHP Program

- ✓ Eligibility
- ✓ CEC PV calculator
- ✓ Module Certification
- ✓ Field Verification (HERS raters)
- ✓ CFI
- ✓ EE requirements



Goals of SB1



- ✓ "... to install solar energy systems with a generation capacity equivalent to 3,000 megawatts ..."
- ✓ "... to establish a self-sufficient solar industry in which solar energy systems are a viable mainstream option in 10 years..."
- ✓ "... to place solar energy systems on 50 percent of new homes in 13 years..."
- ✓ For those developments of 50+ homes with approved maps, builders must offer PV as option as of 1/1/2011



Senate Bill 1 Eligibility Criteria Duties

- ✓ **Energy Commission Must Develop by 1/1/2008**
- ✓ **In Consultation with CPUC and Munis**
- ✓ **Eligibility Criteria and Conditions for Incentives (design, installation guidelines, EE measures, rating standards, etc)**
- ✓ **Adopt Guidelines Through Public Proceedings**
- ✓ **CPUC and Municipal Utilities Solar Programs Must Be Consistent with Eligibility Criteria**



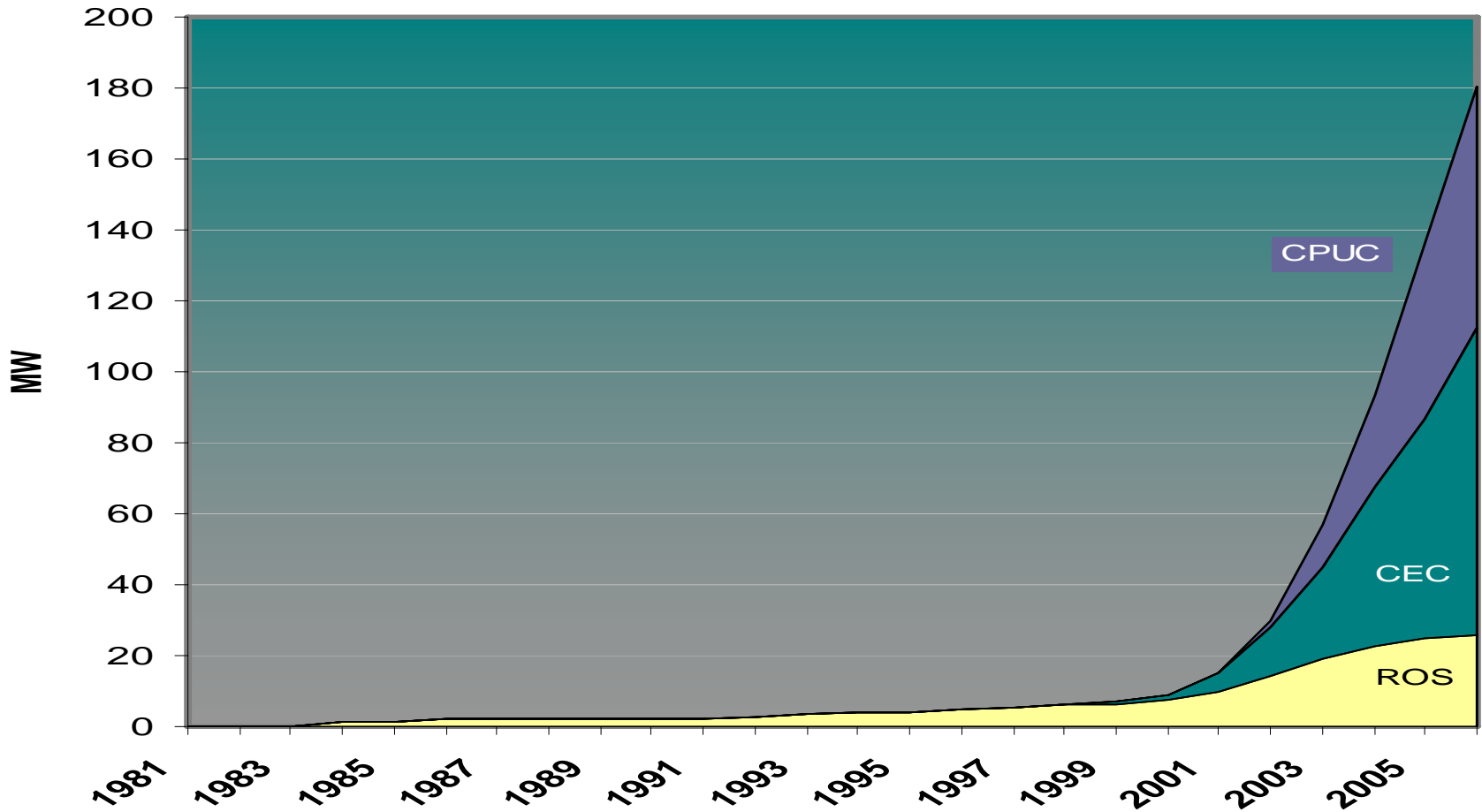
CEC's New Solar Homes Partnership

- ✓ **400 MW Goal by end of 2016**
- ✓ **New residential only: New homes/developments, affordable housing**
- ✓ **Emphasizing energy efficiency**
- ✓ **High performance installations**
- ✓ **Partnership with builders, solar industry, affordable housing experts to design program**
- ✓ **Advisory Committees formed to recommend direction and provide comments**



Building Off A Running Start

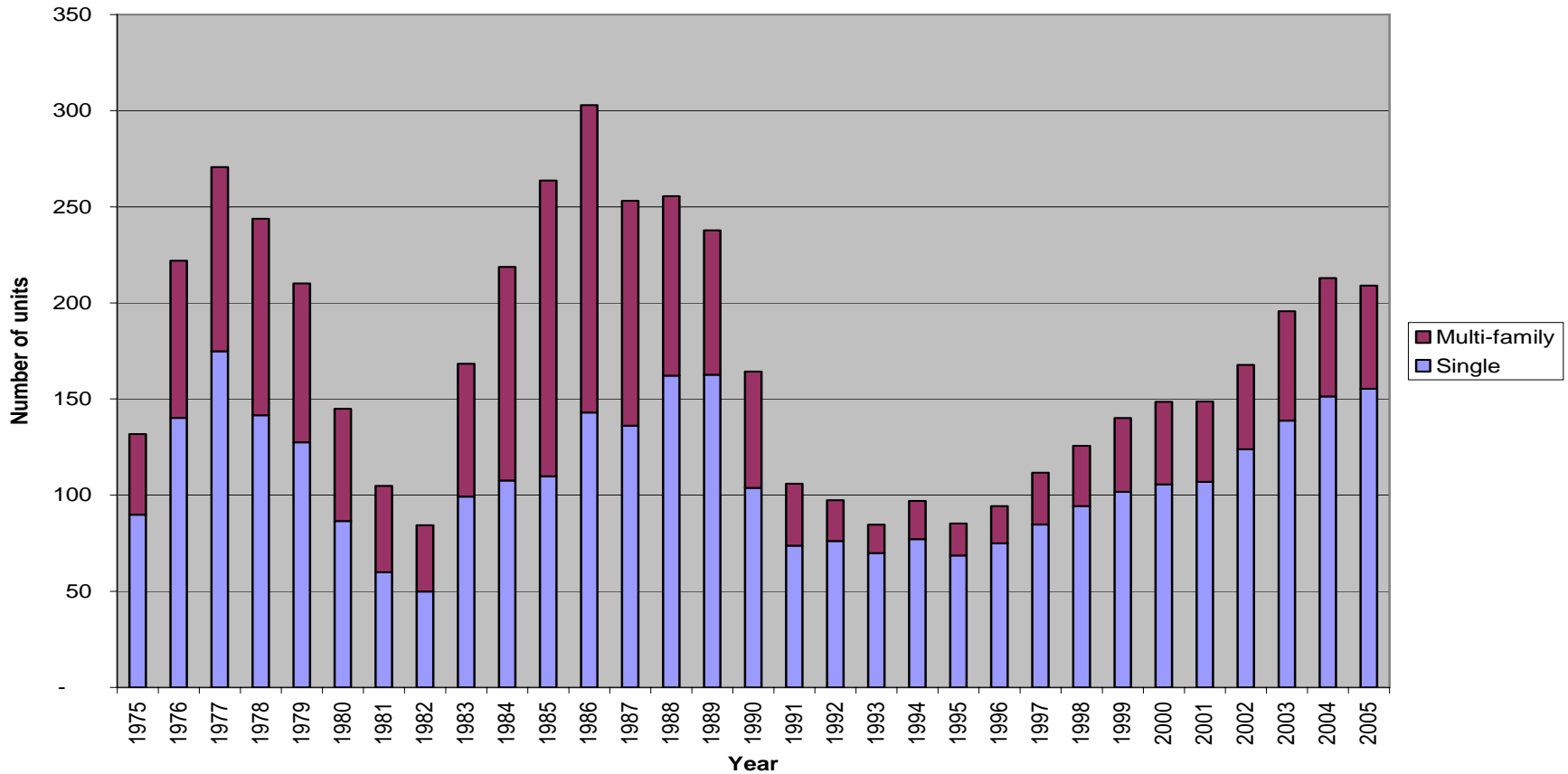
Grid-Connected PV Capacity Installed in California





New Solar Homes Partnership

New Residential Construction in California from 1975-2005



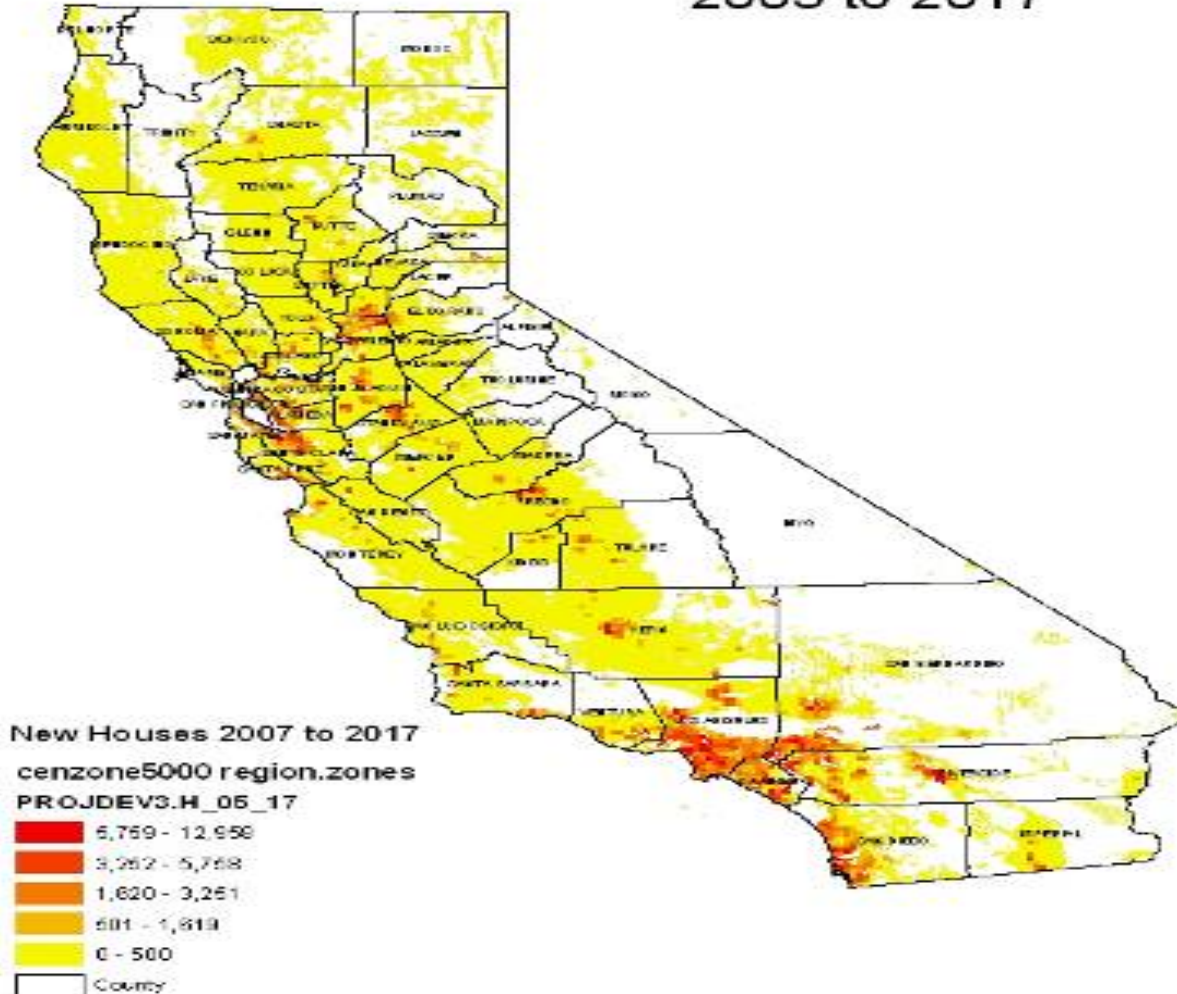


New Homes Add to Peak Demand

Housing Growth
2005 to 2017

✓ 2 Million New Homes
by 2017

✓ Most in Hottest Areas





New Solar Homes Partnership

- ✓ **Adopted: December 13, 2006**
- ✓ **Begins: January 1, 2007**
- ✓ **Incentives: \$2.50/watt and \$2.60/watt for San Jose reference case (Expected Performance-Based Incentive, CEC-PV Calculator)**
- ✓ **Up-front rebate**
 - ◇ **Higher incentives for affordable housing**
 - ◇ **Incentives decline over 10 year period**



\$2.60/watt: Builders commit to installing solar as standard feature

(10¢/watt higher incentive will remain throughout program)

✓ 36 month reservation period

- ◇ **6 or more homes**
- ◇ **Builder commits that 50%+ homes will have solar**
- ◇ **Checkpoints to keep reservation on track and to free up funds if no progress.**
- ◇ **Equipment purchase/financial commitment at 6 month checkpoint**



\$2.50/watt: **Base Incentive**

- ✓ **18 month reservation period**
 - ◇ **Custom homes**
 - ◇ **Developments under 6 homes**
 - ◇ **Where solar is offered as an option**
 - ◇ **Developments where solar will be on less than 50% of homes**



Eligibility

- ✓ **All new residential in PG&E, SCE, SDG&E and Bear Valley Electric service areas**
 - ◇ **New homes – production and custom**
 - ◇ **Affordable Housing**
- ✓ **Energy Efficiency Requirements**
 - ◇ **Minimum: Tier 1 -15% more efficient than current Title 24**
 - ◇ **Encouraged: Tier 2 - 35% more efficient than current Title 24**

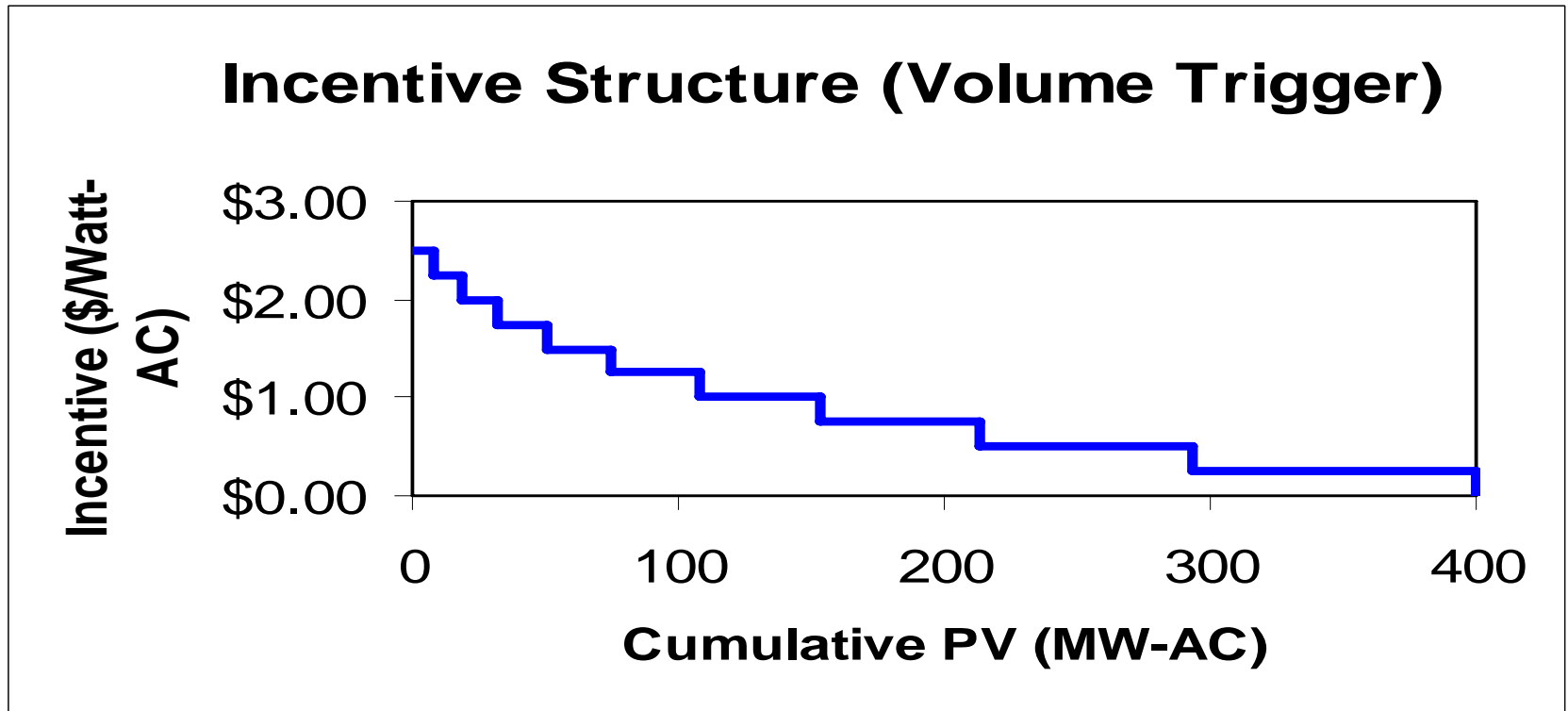


Additional Requirements

- ✓ **10 year PV system warranty**
- ✓ **System sized to no more than 100% of expected load.**
- ✓ **Systems 5 kW or less are presumed in compliance with on-site load limitation**



Volumetric Trigger Mechanism



- 30 days notice of when incentive level will change.



Marketing/Outreach

- ✓ **Builder education/training**
- ✓ **CEC PV Calculator training**
- ✓ **3 year, \$4.3 million contract with Edelman**
 - ◇ **Contract signed – at DGS for approval**
 - ◇ **Initial consultant/staff meeting, 2/11**



Next Steps

- ✓ **Affordable Housing segment expected to be revised early 2007**
- ✓ **Pursuing program administration to be handled by utilities**
- ✓ **Other SB 1 implementation activities**



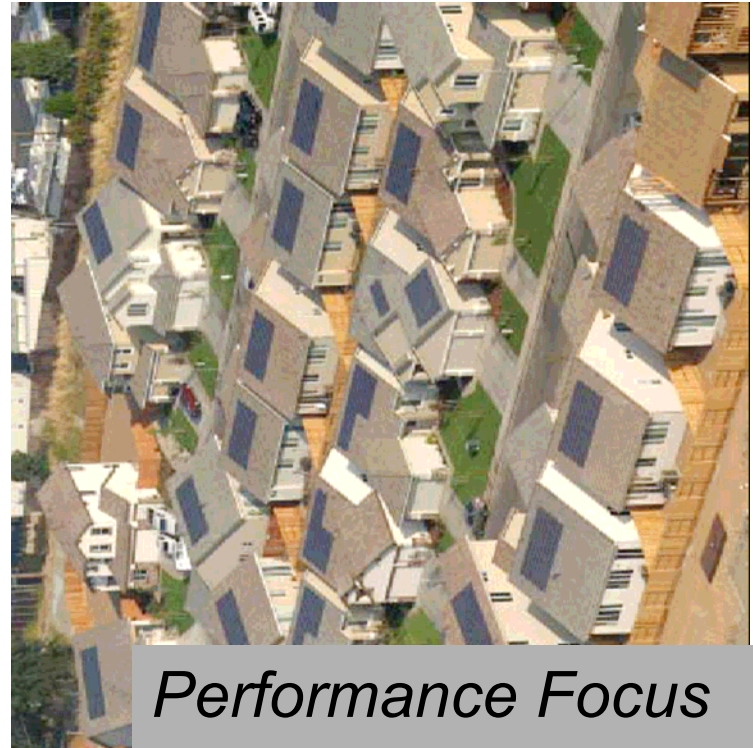
CEC PV Calculator

- ✓ **Based on "Five Parameter Model"**
 - ◇ Algorithms developed by Dr. William Beckman, University of Wisconsin-Madison Solar Energy Lab (originator of F-Chart)
 - ◇ Public Domain Model Published in *Solar Energy*, 80 (2006) 78-88 - www.sciencedirect.com
 - ◇ Uses data from performance tests as inputs
 - ◇ Hourly performance calculation that enables TDV
 - ◇ Uses Commission weather data and climate zones
 - ◇ Uses Certified Module and Inverter data from CEC database
- ✓ **Dr. Beckman implemented algorithms for CEC PV**
- ✓ **Commission would approve other software tools that properly implement the model and datasets**



Expected Performance Based Incentives

- ✓ **Incentives Based On:**
 - ✓ **Location –**
 - ✓ **Insolation**
 - ✓ **Time Dependent Valuation**
 - ✓ **Equipment**
 - ✓ **Modules**
 - ✓ **Inverters**
 - ✓ **Installation**
 - ✓ **Orientation**
 - ✓ **Tilt**
 - ✓ **Shading**



*Performance Focus
On Design Stage,
Where Most Effective*



California Flexible Installation PV Calculator Interface

Choose from list of CEC
certified PV modules (tested
input values)

Choose from list of CEC
certified inverters (tested
input values)

Choose a city from Standards
list (uses CZ weather file)

Select *RUN* for California
Flexible Installation

Select *Specify Additional Parameters*
to evaluate site-specific details

CEC PV Calculator - California Flexible Installation

PV Module:

Standoff Height:

Number of Modules in Series:

Number of Parallel Strings:

Inverter:

City:

Climate Zone:

For California Flexible Installation:

Site-Specific Detailed Input:

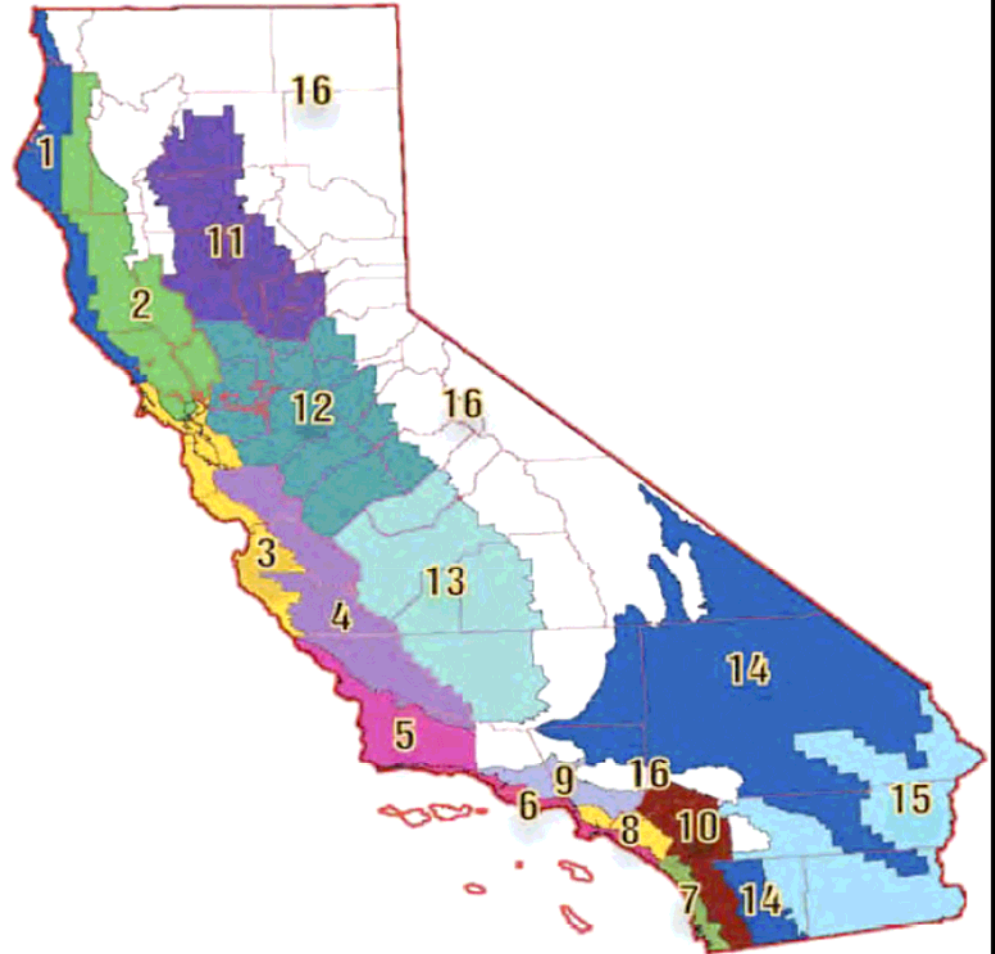
Run Status:

User Input Window



Reference System Location

San Jose (Climate Zone
4)





Module Certification

- ✓ **Manufacturer Certification of Module Test Data**
 - ◇ **IEC Standard 61215 – Crystalline Silicon Modules**
 - ◇ **IEC Standard 61646 – Thin-Film Modules**
 - ◇ **Use Laboratories Accredited by the International Laboratory Accreditation Cooperation for Testing**
 - ◇ **Specify Test Configuration for Cell Temperature Testing for BIPV**
 - ◇ **Certification Mandatory Starting January 1, 2008**
- ✓ **Manufacturer Certification of Inverters**
 - ◇ **Use Full Data Certified to the Commission**

Appendix 3



Field Verification

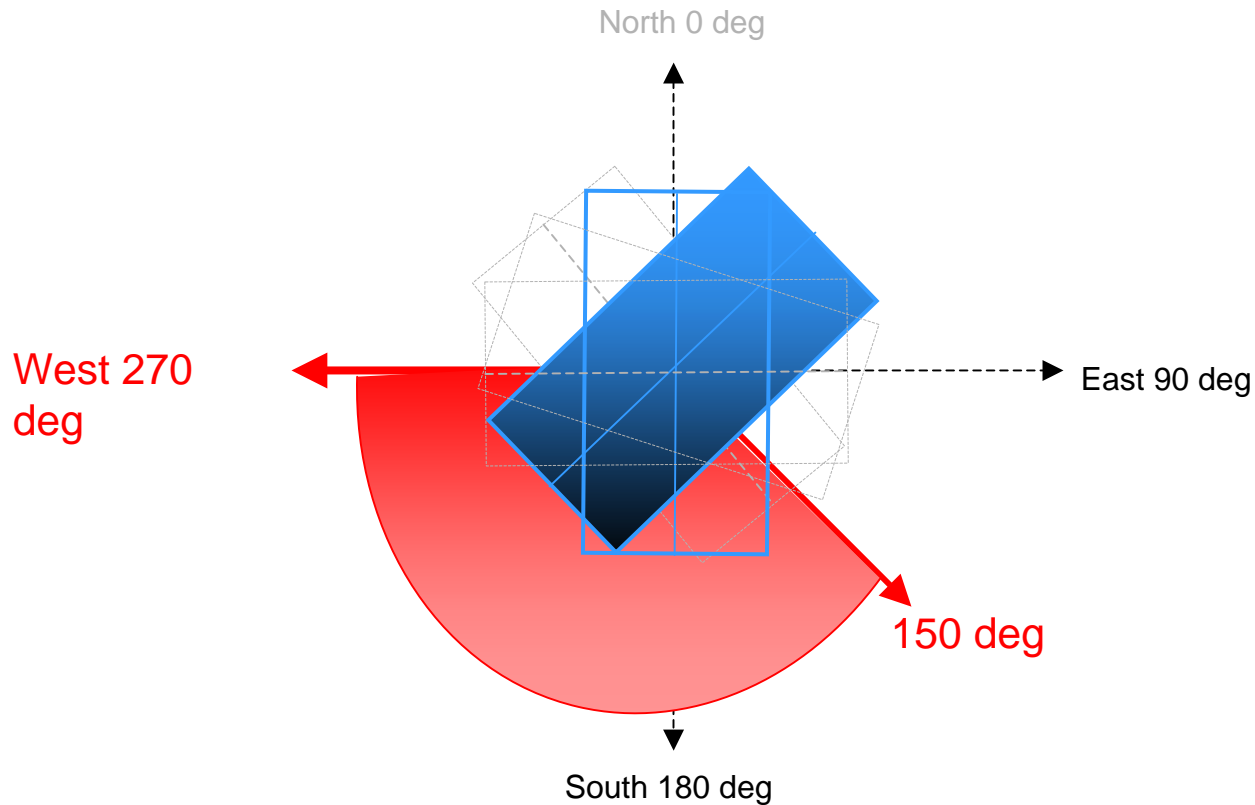
- ✓ **Visual Inspection**
 - ◇ Verify that installed equipment (modules and inverter) are the same as specified
 - ◇ Verify that the system meets the California Flexible Installation Criteria OR
 - ◇ Verify that site-specific installation details are the same as specified in the calculations
- ✓ **Shading Evaluation**
 - ◇ Check for "minimal shading" criterion
 - ◇ Check for shading obstructions specified in the calculations
 - ◇ Check for trees that will shade modules at maturity
- ✓ **Performance Verification**
 - ◇ Measure solar irradiation and ambient temperature
 - ◇ Look up the expected output for the measured conditions on the table generated by the CEC PV software
 - ◇ Verify AC output displayed on the inverter is as expected
- ✓ **Installer Checks 100%; HERS Rater Uses Sampling**

Appendix 4



California Flexible Installation Criteria

- *Azimuth*
- *Roof Pitch (4:12 - 7:12)*
- *Minimal Shading*





Connection To Energy Efficiency

- ✓ **Two Levels:**
 - ◇ **Minimum is Tier I - 15% Savings Beyond 2005 Building Standards, Consistent With Current Utility New Construction Programs**
 - ◇ **Preferred is Tier II -35% Savings Beyond 2005 Building Standards, Plus 40% Beyond on Cooling Budget**
- ✓ **Both Levels Include Energy Star Appliances, Where Applicable**
- ✓ **Expect Energy Efficiency Incentives From Utility Programs**



Tier II – Commission Preferred Level

- ✓ **Moves Towards Zero Energy New Homes**
- ✓ **Achieved by Current Building America Homes in California, Through Measures Like:**
 - ◇ **R-38 Ceiling Insulation**
 - ◇ **High Efficiency Central Heat**
 - ◇ **High Efficiency AC**
 - ◇ **Ducts Sealed, Buried in Ceiling Insulation**
 - ◇ **Tankless 0.82 EF Water Heater**
 - ◇ **High-Efficacy Lighting**



www.gosolarcalifornia.ca.gov

[Solar for New Homes](#) | [Solar for Existing Homes](#) | [Businesses, Schools & Public Housing](#) | [Solar for Affordable Housing](#) | [Solar for Municipal Utilities' Customers](#) | [Announcements](#) | [Solar Information](#)

Go Solar California!

California has set a goal to create 3,000 megawatts of new, solar-produced electricity by 2017. From this page, you'll be able to go to the websites for solar on new or existing homes and solar for businesses, schools and public buildings.



The California Energy Commission funds solar electricity systems on **NEW** homes.



The California Public Utilities Commission funds solar electricity systems on **businesses** and **EXISTING** homes.



CALIFORNIA ENERGY COMMISSION

Efficiency, Renewables and Demand Analysis Division

ERP/ NSHP CALL CENTER 1-800-555-7794

CALIFORNIA ENERGY COMMISSION

Renewable Energy Program

Manage your electricity costs

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Thank you for your time and attention

