



CALIFORNIA ENERGY COMMISSION

New Solar Homes Partnership

Overview

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New Solar Homes Partnership



- New residential buildings only
 - Production homes
 - Affordable Housing
 - Multi-family apartments
 - Custom homes
- CEC will specifically target and work with the builder/developer community and affordable housing stakeholders



Presentation Overview

- Who and What is Eligible
 - Certified Technologies
 - Energy Efficiency Requirements
- Expected Performance Based Incentives
 - Declining Incentive Levels
- Field Verification
- Ancillary Assistance



Who and What is Eligible

- New Homes In IOU Service Territories
 - Reservation Process as in ERP and SGIP
 - Staff suggested 24 month Reservation Period
 - **Advanced Metering Infrastructure**
- Technologies
 - Photovoltaics (Including Tracking PV, Concentrating PV)
 - Sized Primarily To Meet Onsite Load
 - **Solar Thermal Electric Generators**
 - **Solar Thermal Heating and Cooling**



Certification

- PV Module
 - Inputs to performance calculator to be certified (V_{mp} , I_{mp} , V_{oc} , I_{sc} , temperature coefficients at STC conditions and the installed NOCT at specified conditions)
 - Possible Commission-approved administration mechanism like NFRC following specified tests and laboratory verification requirements
- Inverter – Sandia test protocol
 - Current ERP eligibility criteria
 - Use the tested values (efficiency at various operation conditions of voltage and power) in inverter modeling
- Metering/Communications
 - Current CEC list plus Requirement for remote communication



High Levels of Energy Efficiency

- New Solar Homes Partnership Goal
 - Readily available energy efficiency measures
 - Honors state loading order priority (delivers both priority technologies at once)
- Lowest level under consideration
 - 15% better than T24
 - Hope to coordinate with \$400/\$500 per house EE incentives
- Higher level under consideration - or Tier II
 - Building America (30-40% better than T24)
 - Identified measures typically used at about \$2000/house cost
 - Work to get % of this cost covered by EE incentives



Incentive Levels Over Time

Year	Volume (MW)	Incentive \$/Watt	Annual Budget
2007	5	2.25	11.25
2008	10	2	20
2009	15	1.75	26.25
2010	20	1.5	30
2011	30	1.25	37.5
2012	40	1	40
2013	50	0.8	40
2014	65	0.6	39
2015	80	0.4	32
2016	100	0.2	20



Incentive Trigger Mechanism

Volume Trigger By Confirmed Reservation

- Ensures Budget For Goal
- Provides Automatic Reaction to Market Growth
- 1- month Lag For Market Notice
- Time Trigger (6 months or 1 year)
 - Provides Market Pull In Slow Periods
 - Ensures Timing For Goal
- Commission Continues To Have Adjustment Flexibility



PV Performance Issues

- Design/Installation Factors
 - Tilt, Orientation, Site characteristics such as shading, etc.,
 - Module/Inverter mismatch, wiring, etc.
 - Location (Average Annual Insolation)
 - Degradation
- Ongoing Normal Performance Factors
 - Dirt, Shading
 - Weather variability
- Infrequent But Significant Factors
 - Inverter failure
 - Fuses, etc.

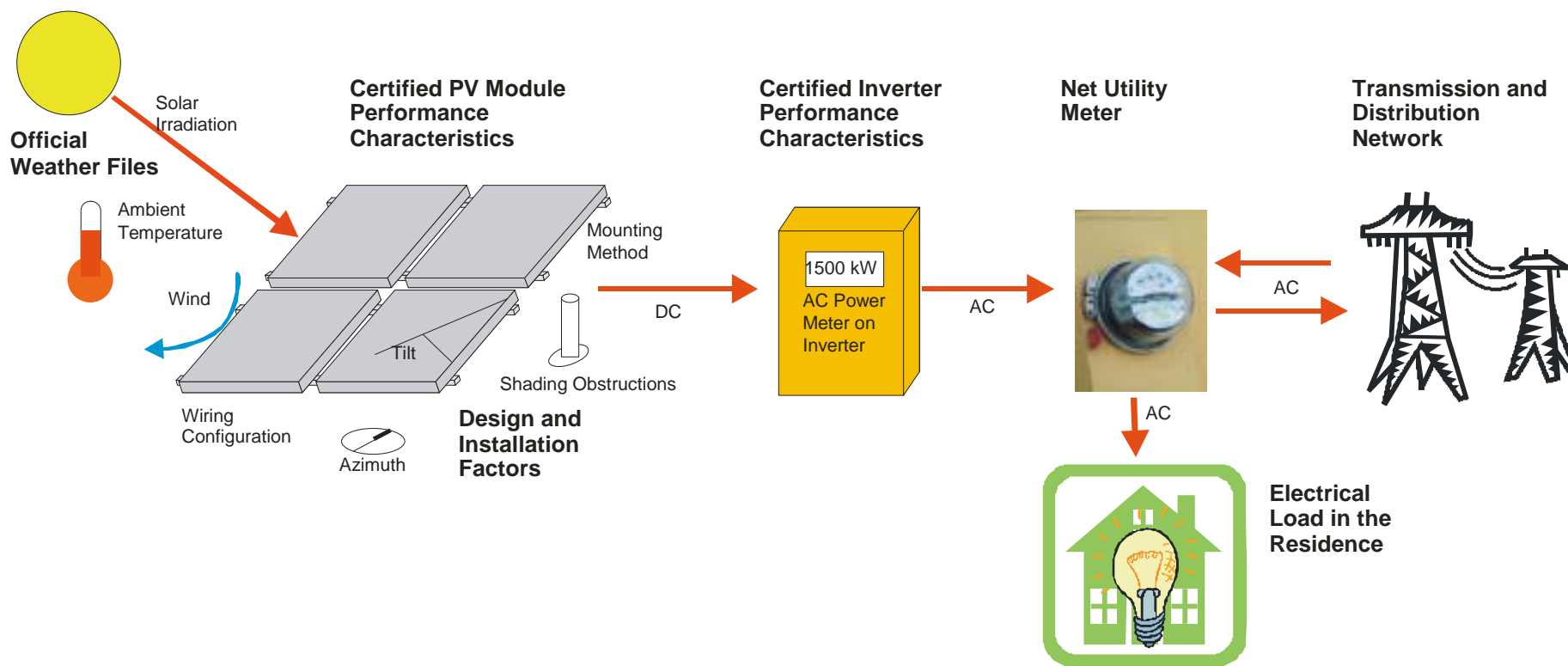


Expected Performance Based Incentives (EPBI)

- Incentives Based on PV Performance Calculator with TDV Place Priority on High production in sunnier climates
 - Higher incentives in high peak load, high growth, high T&D cost areas
 - Higher incentives for efficient PV modules and inverters
 - Lower incentives for partially shaded arrays, poor orientation or tilt
- Commission defines reference system/location
- Performance calculator used to determine expected performance of actual system/location and compare to the reference to determine the incentive



PV Performance Calculations





Calculator Interface

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

Mounting method affects the temperature of the PV module

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

Choose a city from Standards list (CZ weather file)

Check this box if the PV array is partially shaded. When checked user will enter more data.

CEC-PV software

PV Module: ABC Module-100 Series

Mounting: Building Integrated

Number of Modules in Series: 8

Number of Parallel Strings: 3

Slope: 22.5

Azimuth: 180

Inverter: XYZ Inverter-100 Series

City: Sacramento CO

Simulation Period: Annual

Shading

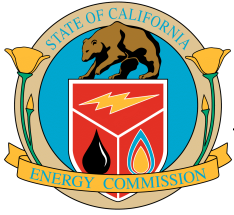
Orientation	Distance to Obstruction (ft)	Height of Obstruction above PV Module (ft)	Altitude Angle from Horizontal
ENE			
E			
ESE			
SE			
SSE			
S			
SSW			
SW			
WSW			
W			
WNW			

Run

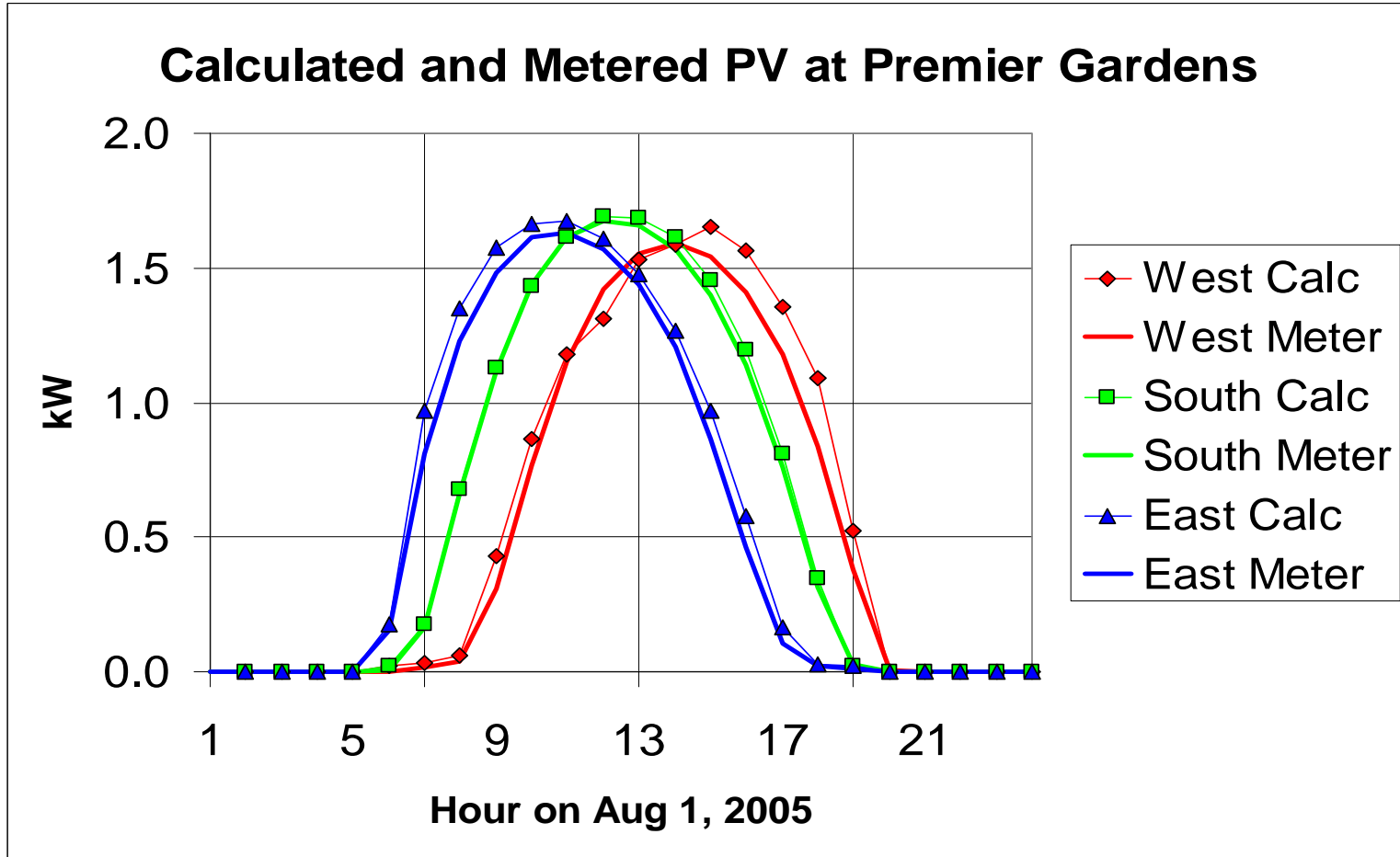
Results

	kWh Production	TDV Production
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
Annual		

Example results



Validation of model



48 - GE BIPV 55W each panels
SMA 2500 inverter

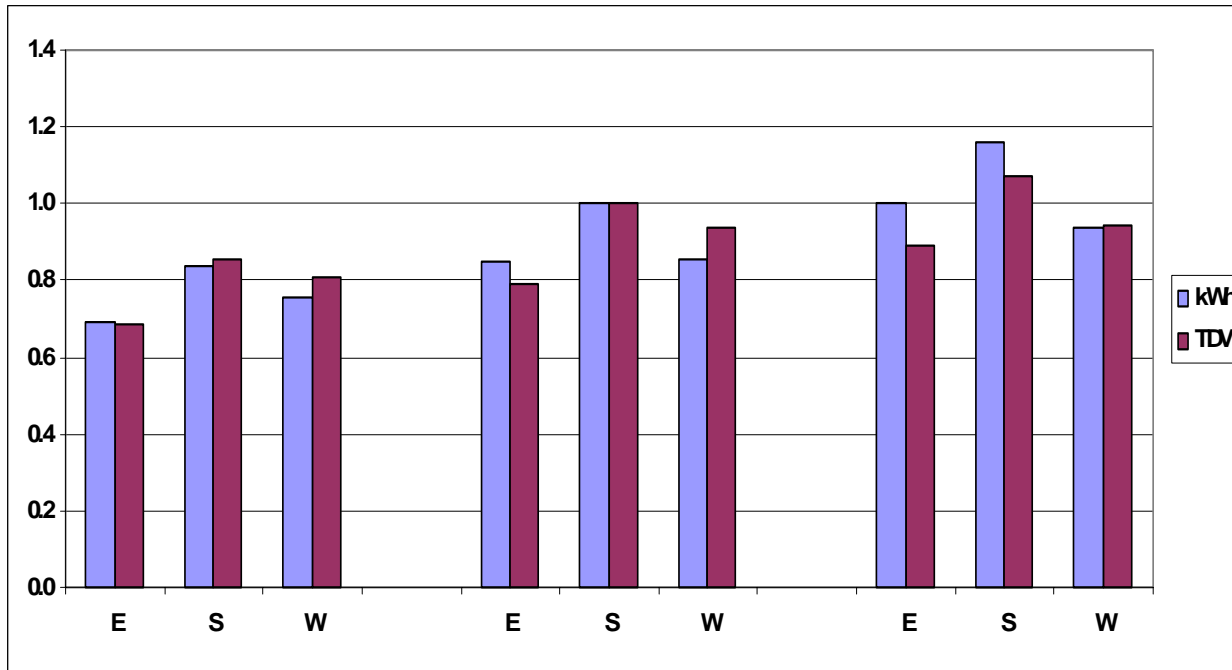
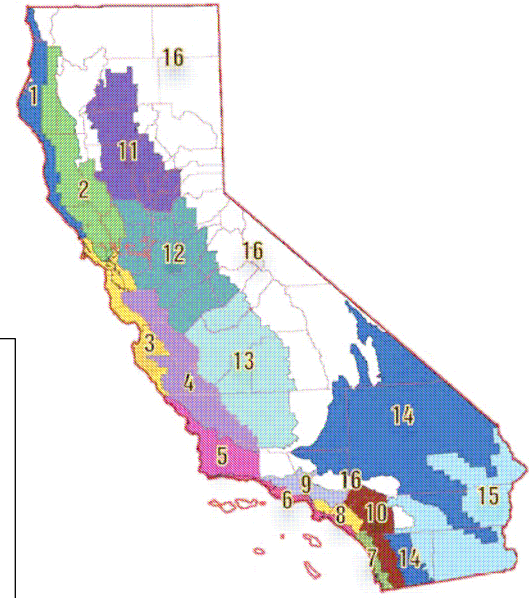


TDV (Time Dependent Valued) Energy

- Adopted by the Commission for the 2005 Building Energy Efficiency Standards (TDV also used by the CPUC for 2006-08 energy efficiency program planning)
- Places time-of-use weighting on energy during peak periods
- Accounts for variation in marginal electricity generation, transmission and distribution (T&D) costs by region
- California's sunniest climates correspond to climates with hottest summers, highest peak demand, greatest housing starts;



Production By Climate Zone



Arcata – CZ1

Sacramento – CZ12

Palm Springs – CZ15



Field Verification Process

- Same process used for field verification for energy efficiency for Title 24, New Construction programs, Energy Star, Federal Tax Credits
- Installer tests and certifies every system
- HERS raters verify and test a sample of systems
 - under contract to the builders (value-added quality control service) and
 - under the oversight of HERS providers (CHEERS, CalCERTS, CBPCA – over 1,000 HERS raters statewide)
- Commission develops field verification protocols (appendices to Guidebook and Standards)
- Commission insures that HERS Providers develop training curriculum to train HERS Raters



Field Verification Tasks

- Visual Inspection
 - Verify that installed equipment (modules and inverter) are the same as specified
 - Verify that the installation (orientation, tilt, etc.) is the same as specified
- Shading Evaluation
 - Check for "no shading" criterion
 - Check for shading obstructions included in the calculations
 - Check for trees expected to 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



Ancillary Assistance (Market Building)

- Guidelines And Technical Support For Builders
- Training Programs and Videos For Builders, Installers, HERS Raters
- Strong branding campaign, outreach program to help achieve goals
 - Need some basic market research updates to get to what really will work – not just willingness to pay
- Special incentives and assistance for Affordable Housing