



California Solar Initiative
&
Zero Energy New Home Program

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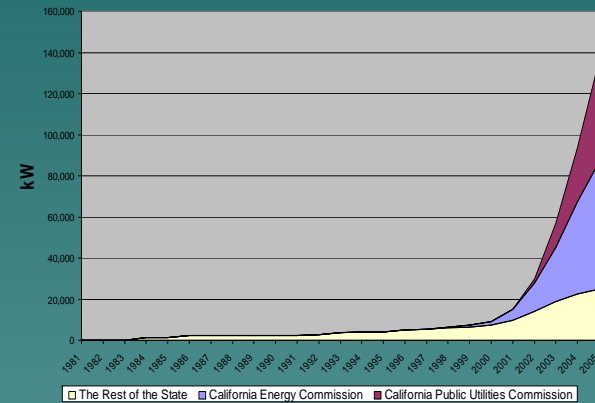
June 23, 2006

California Solar Context

- ◆ Baseline: Existing Programs
 - ~150 MW since 2000
 - CEC: < 30 kW
 - CPUC: > 30 kW
 - POU programs
- ◆ Next Generation: CSI and NSHP
 - 3000 MW by 2016
 - CEC: New Residential
 - CPUC: Everything Else
 - Work With POU's To Coordinate Statewide

Transition

Grid-Connected PV Capacity Installed in California Cumulative



High Levels of Energy Efficiency

- ◆ NSHP will require EE at least 15% beyond Title 24 Standards
 - Probable Enhanced incentive for Higher Energy Efficiency Levels
 - Leads Into Zero Energy Homes
- ◆ CSI at CPUC
 - Audits for most retrofit applications
 - Beyond Title 24 for New Commercial

Eligibility Parameters

- On-site Generation in IOU Service Territories
- Certified Components and Systems
- Photovoltaics (Including Tracking PV, Concentrating PV)
 - Solar Thermal Electric Generators?
 - Solar Thermal Heating and Cooling
- Metering and Rate Design

Incentive Structures

- ◆ NSHP:
 - Expected Performance Based Incentive (EPBI)
- ◆ CSI at CPUC
 - Expected Performance Based Incentive for < 100 kW
 - 5-year PBI for > 100 kW
- ◆ Ancillary Assistance: Training, Recognition, Technical, Marketing and Outreach

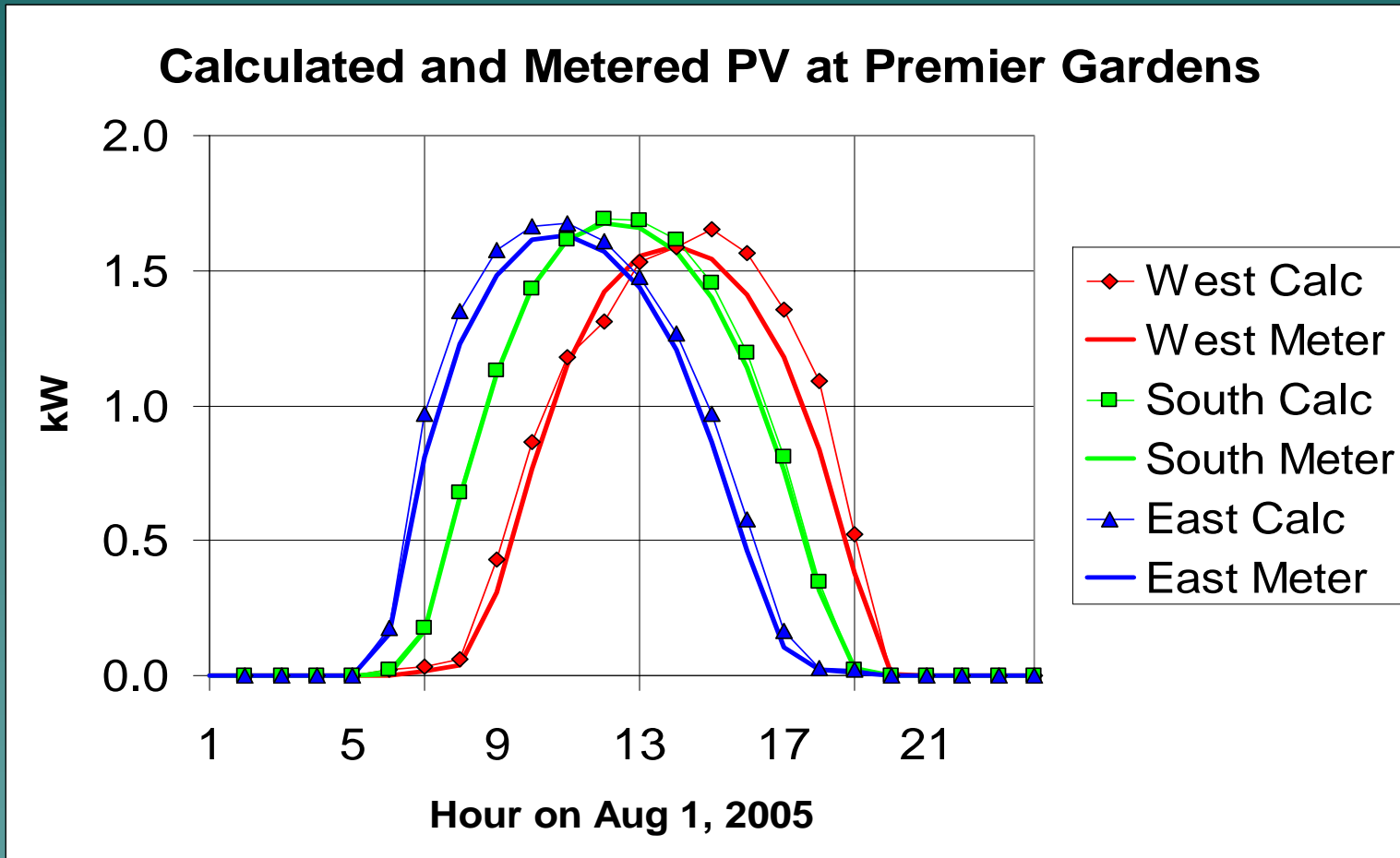
PV Performance Issues

- ◆ 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

Validation of model



48 - GE BIPV 55W each panels
SMA 2500 inverter

Certification

◆ PV Module

- Inputs to performance calculator to be certified
Possible Commission-approved administration mechanism like NFRC and CRRC (Powermark or other)
- Specify tests (ASTM E 1036) 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

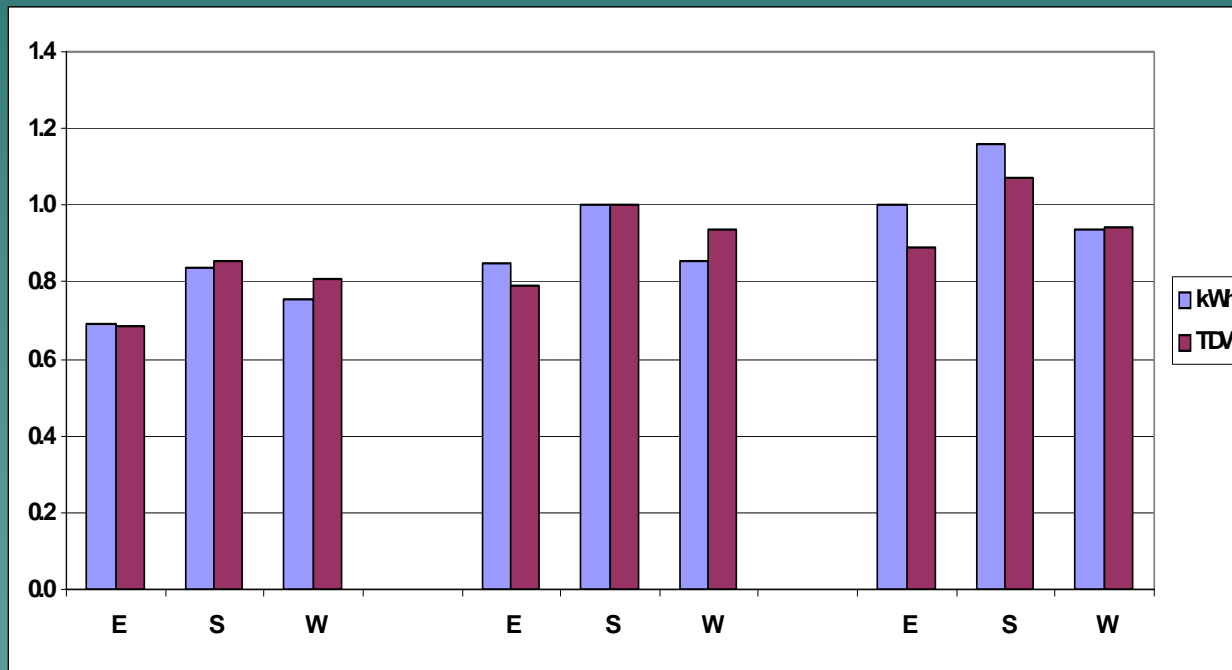
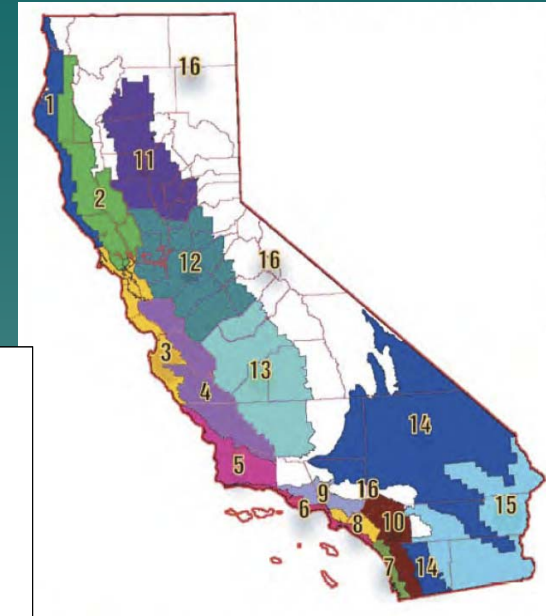
Field Verification Process

- ◆ 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

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

ZENH Program Goals

ZENH develops and pilots new home design which optimizes energy efficiency and onsite solar generation to reduce overall homeowner energy bills

Goal 1: Reduce Energy Use by 25%

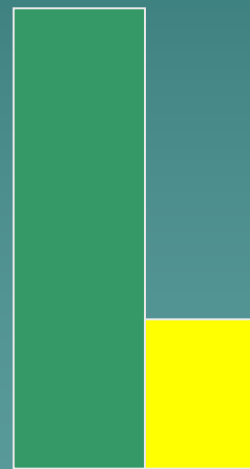
Title-24, 2005 energy budget



No PV
TDV Method

Goal 2: Reduce Electricity Bills by 70%, Limit Incremental cost to ZENH homeowner to \$5,000

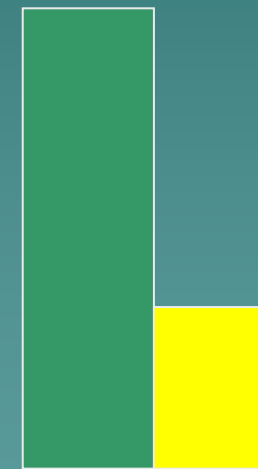
Expected Bill



TOU Tariff
Net Metering

Goal 3: Reduce Peak Demand to 1 kW Regardless of House Size

Pre-ZENH



House Load
minus PV
output

ZENH Communities

- ◆ **AEC Contract:** One housing development project consisting of 75 homes in Southern California
 - Utility Market Model
- ◆ **PowerLight Contract:** Two housing development projects consisting of:
 - 144 single-family homes in Rocklin, CA
 - 32 multi-family homes in Pleasanton, CA
- ◆ **Global Green Contract:** Two multi-family affordable housing development projects:
 - Community of Friends (55 units - Los Angeles)
 - Community Housing Works (56 units - Poway Project)