

# California Solar Initiative

California Public Utilities  
Commission

Presentation to

California PV Utility Managers Forum

June 27, 2006

A stylized silhouette of a mountain range in shades of teal, located at the bottom right of the slide.

# New California Solar Initiative – CPUC's Program

- ◆ CPUC Decision January 2006
- ◆ CPUC portion to be \$2.5 billion over 2007-2016
- ◆ Goal of 2600 MW (equiv. to 4-5% of California's electricity supply). (+ 400 MW CEC NSHP)
- ◆ Supports consumer adoption of solar and helps solar industry become self-sustaining
- ◆ 10% affordable housing & low income set-aside (approx. \$25 million per year)

# New California Solar Initiative

## ◆ CPUC Program

- Existing residential buildings
  - ◆ Single-family homes
  - ◆ Low-income / affordable housing
  - ◆ Multi-family apartments
- All commercial buildings
  - ◆ Schools
  - ◆ Government buildings
- All industrial facilities
  - ◆ Warehouses
  - ◆ Manufacturing
- All agricultural facilities



Panels on an existing home



University of California, Hayward

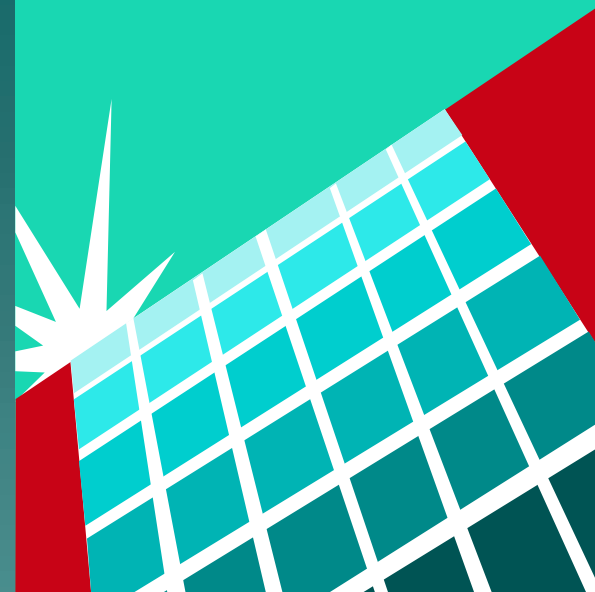
# CPUC Phase 1 Issues & Milestones – January 2007 Implementation

- ◆ 2 Different performance-based incentive structures
- ◆ Metering of performance
- ◆ Energy efficiency requirements
- ◆ All solar technologies eligible, except a pilot only for solar hot water heating
- ◆ Milestones:
  - Staff Proposal released            April 25
  - Public Workshop                    May 4
  - Party Comments                    May 16 & 26
  - Proposed Decision                July 25 target
  - Commission Decision             August 24 target

# Phase 2 Issues and Milestones for Mid-2007 Implementation

- ◆ Affordable Housing June-September?
  - Discussions/proposals from stakeholders of
    - ◆ low-income communities,
    - ◆ affordable housing developers, managers & lenders.
  
- ◆ Other Phase 2 Issues: Summer-Fall 2006
  - Marketing & outreach
  - Demonstration & deployment strategies to lower solar costs, boost performance
  - Program evaluation and cost-benefit analysis methods
  - Solar output treatment under RPS and RECs
  
- ◆ Phase 2 Staff Proposal Q4 2006
  
- ◆ Proposed Phase 2 Decision Q1 or Q2 2007

# Eligible Technologies



- ◆ Solar electric & thermal applications on customer side of meter
- ◆ Between 1 kW and 5 MW in size  
Net energy metering credits up to 1 MW



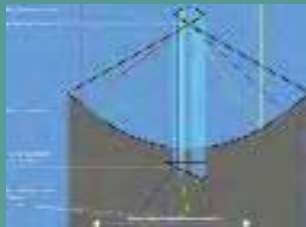
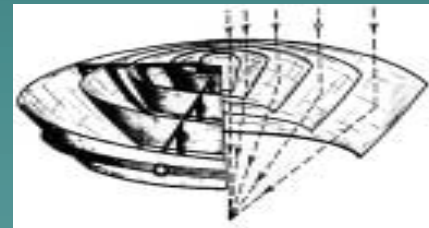
# Non-PV Solar Technologies

## Objective

Allow & encourage all forms of solar technologies

## Staff Recommendations

- ◆ Provide incentives for Concentrating Solar technologies:
  - ◆ Concentrating PV
  - ◆ Parabolic dish/engine
  - ◆ Parabolic trough
  - ◆ Power tower
- ◆ Incentives based on displaced grid electricity or gas



# Staff Incentive Proposal Principles

- ◆ Goal: eliminate ratepayer subsidy over 10-years
- ◆ Achieving 2600 solar MW with fixed budget requires lowering solar kWh or BTU cost via:
  - Improved or new technologies
  - Enhanced solar system efficiency or performance
  - Lower sales & installation costs
- ◆ Pay for expected or actual solar performance, not installed capacity, not % of cost
- ◆ Incentive design principles: Make net solar cost
  - cost-competitive with retail energy purchases
  - yield ten year break-even on a 25-30 year solar system.

# CPUC Staff's **Proposed** Program Incentives for 2007-2016

## Two incentive levels for 2007:

- \$2.25 per watt for residential and non-taxable entities
- \$1.50 per watt for taxable commercial entities (reduced due to 30% federal tax credit)
- ◆ **Expected Performance Based Buydown (EPBB) for systems < 100kW** (or a smaller threshold size)
  - One-time up-front payment based on EXPECTED system performance
  - Incentive = Incentive Base Rate x System Rating x Design Factor
  - Design factor accounts for panel orientation, tilt, shading; maybe geographic location in California
- ◆ **Performance Based Incentive (PBI) for Larger Systems**
  - Equivalent to EPBB, but paid based on metered kWh output over 5 years, e.g. 17 cents and 26 cents/kWh = equivalent to \$/watt
  - No up-front incentive; owner pays cash or finances 100% cost.

# PBI – Calculation Method

## Objectives

- ◆ Metering/communication to support performance feedback

## Staff Proposal

- ◆ From EPBB \$/watt incentive, derive cents per kWh incentive based on:
  - ◆ a system capacity factor of 0.2 (flat panel) or 0.3 (tracking system)
  - ◆ PBI payments fixed and flat for each applicant over a 5-year period.
- ◆ Pay based on actual metered solar output
- ◆ Permit upside payments 10% greater if metered output confirms higher production (e.g. effective capacity factors of 0.22 or 0.33).

## Rationale

- ◆ Larger systems and their owners:
  - ◆ Have access to capital finance to pay higher first costs under PBI incentive payments.
  - ◆ Likely to have maintenance staff if alerted to sub-par performance.
- ◆ 5-year payment period (parties called for 3-10 year periods)
- ◆ Propose PBI for BIPV -- difficult to fix expected performance depending upon installation details.

## Taxable and Non-Taxable Incentive Examples -- 200 kW System

<b>Example of Proposed PBI Incentives for &gt; 100 kW Solar</b>	
Assume 200 kW (AC-CEC) system.	
Assume total installed cost is \$8.00 per AC-CEC watt.	
System size -kW (AC-CEC)	200
Installed System Cost	\$ 1,600,000
Capacity Factor (CF)	<b>0.2</b>
Expected kWh performance per watt	1.752
Expected kWh Performance/yr	350,400
Expected kWh Performance over 5 years	1,752,000
<b><u>PBI Example for Taxable Entity</u></b>	
CSI Incentive	
<b>Basis for incentive/watt</b>	<b>\$ 1.50</b>
Expected 1 yr kWh performance per watt	1.752
Expected 5-yr kWh performance per watt	8.76
<b>Incentive per kWh over 5 years @ .2 CF</b>	<b>\$ 0.17</b>
<b><u>.2 CF</u></b>	
<b>Expected CSI Incentive over 5 years</b>	<b>\$ 300,000</b>
<b>Federal Tax Incentive @ 30% of cost</b>	<b>\$ 480,000</b>
<b>TOTL EXPECTED INCENTIVES</b>	<b>\$ 780,000</b>
Net cost to system owner (before deprec.)	\$ 820,000
<b>effective net cost per kWh over 25 years'</b>	<b>0.094</b>

<b><u>PBI Example for Non-Taxable Entity</u></b>			
<b>2.25</b>			
<b>\$ 0.26</b>			
<b><u>.2 CF</u></b>			
<b>\$ 450,000</b>			
<b>\$ -</b>			
<b>\$ 450,000</b>			
<b>\$ 1,150,000</b>			
<b>0.131</b>			

# PBI – Encouraging Higher Performance

<b>Example of Proposed PBI Incentives for &gt; 100 kW Solar System</b>			
Assume 200 kW (AC-CEC) system.			
Assume total installed cost is \$8.00 per AC-CEC watt.			
System size -kW (AC-CEC)	200		
Installed System Cost	\$ 1,600,000		
Capacity Factor (CF)	<b>0.2</b>	<b>0.22</b>	
Expected kWh performance per watt	1.752	1.9272	
Expected kWh Performance/yr	350,400	385,440	
Expected kWh Performance over 5 years	1,752,000	1,927,200	
<b>PBI Example for Taxable Entity</b>			
CSI Incentive			
<b>Basis for incentive/watt</b>	<b>\$ 1.50</b>		
			<u>Effective incentive paid per watt</u>
Expected 1 yr kWh performance per watt	1.752		
Expected 5-yr kWh performance per watt	8.76		
<b>Incentive per kWh over 5 years @ .2 CF</b>	<b>\$ 0.17</b>		<b>\$ 1.50</b>
5- yr output if system performs at .18 CF	7.884 kWh per watt		\$ 1.35
5-yr output if system performs at .22 CF	9.636 kWh per watt		\$ 1.65
	<b>.2 CF</b>	<b>.22 CF</b>	
<b>Expected CSI Incentive over 5 years</b>	<b>\$ 300,000</b>	<b>\$ 330,000</b>	
<b>Federal Tax Incentive @ 30% of cost</b>	<b>\$ 480,000</b>	<b>\$ 480,000</b>	
<b>TOTL EXPECTED INCENTIVES</b>	<b>\$ 780,000</b>	<b>\$ 810,000</b>	
Net cost to system owner (before deprec.)	\$ 820,000	\$ 790,000	
<b>effective net cost per kWh over 25 years'</b>	<b>0.094</b>	<b>\$ 0.082</b>	

# 10-Year Market Adjustment Mechanism (“Trigger”)

## Objective

- ◆ Solar market to be self –sustaining by 2017
- ◆ Transparent and predictable trajectories for decreased subsidies
- ◆ Measured steps – don’t disrupt solar markets

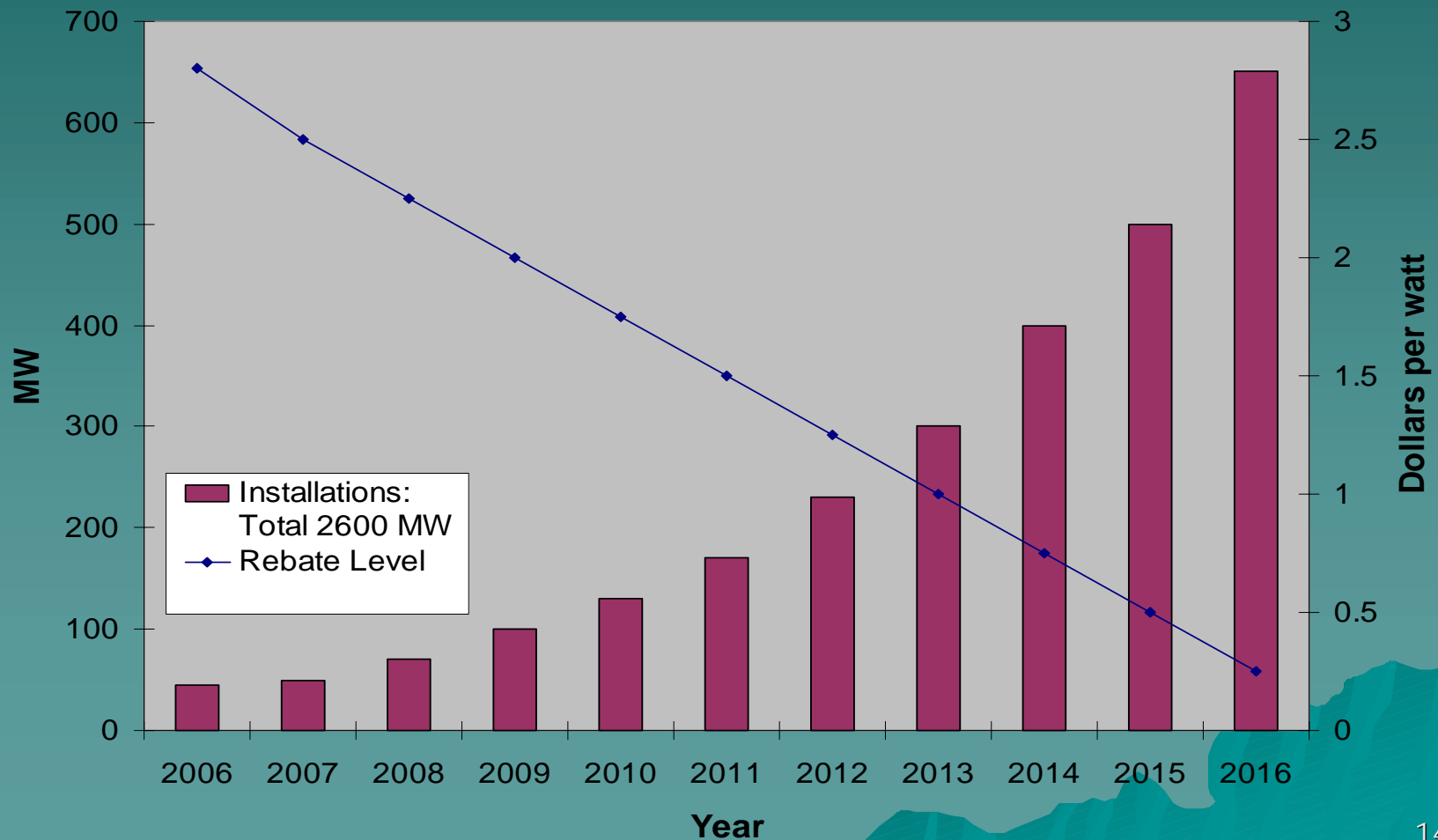
## Staff Proposal

- ◆ Simple 10% annual ramp down of incentive level
- ◆ Reserve flexibility with advance notice for adjustments for
  - Breakthroughs in technology performance or cost
  - Federal tax credits change

## Rationale

- ◆ Place downward pressure on solar price; not reactive to market price.
- ◆ Avoid complex models -- may not capture all market factors.

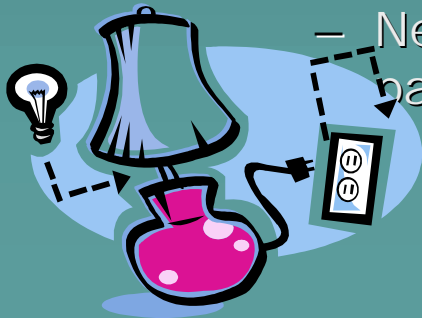
# Sample View of CPUC Solar Installations and Rebate Levels



# Energy Efficiency Connection

## Program Objectives:

- ◆ Encourage customers to consider energy efficiency and solar investments side-by-side and choose best options for each situation.
- ◆ Support optimal utilization of ratepayer incentives for both energy efficiency and solar.
  - Energy efficiency audits required to receive solar incentive
  - Audit waived for buildings with an acceptable energy efficiency audit within the past 3 years
  - New construction meeting Title 24 requirements within past 3 years exempt



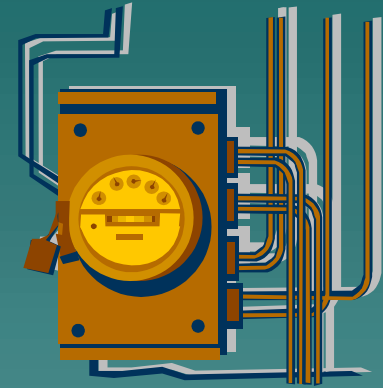
# Metering Requirements

## Objectives

- Communicate system performance
- Basis for PBI incentive payment

## Staff Proposal

- All CSI solar meters must:
  - ◆ be a dedicated revenue-grade meter
  - ◆ use a web-based reporting system or utility reading and reporting system
  - ◆ have the option to attach a wireless modem (potentially through a cable or phone jack)
- Systems 30 kW+ must be able to communicate remotely via the Web



## Potential 3000 MW of DG RECs -- a Magnitude to Command Attention re: RPS + Potential REC Market Value to Owner

### Regulatory History

- ◆ D.02-10-062: CPUC determined new renewable DG, including customer side of the meter, eligible under the RPS.
- ◆ D.05-05-011: CPUC determined that
  - “the owner of the renewable DG facilities owns the RECs associated with the generation of electricity from those facilities.”
  - the extensive DG subsidies provided by ratepayers may entitle utilities to claim some share of the RECs produced.

# The Existence of Ratepayer Subsidies Confounds the REC Ownership Question

## Context

- ◆ For central station renewable generation, transference of RECs to a utility requires generator participation in RPS via a contract.
- ◆ Otherwise, RECs are retained by the facility owner.
  - At present, in California's bundled regime, unbundled RECs cannot be used for RPS compliance purposes.

## DG Issues

- ◆ Utilities would like to count renewable customer DG toward RPS.
- ◆ RECs present potential new revenue stream that DG facility owners are reluctant to simply yield to utilities.
- ◆ Did ratepayer DG subsidies essentially "buy" the green attributes, and thus the associated RECs?

## Issues to be Decided in CPUC's DG Proceeding (R.06-03-004)

1. In light of ratepayer subsidies, what is the appropriate **methodology to determine the share of RECs** from renewable DG facilities **that should be transferred to utilities** (without additional payment, and perhaps to count toward RPS), versus retained by the DG facility owners?
2. To the extent that renewable DG is to count toward the RPS goals, what **metering requirements** are appropriate to ensure accurate measurement of DG output?