



Policies, Programs & Trends

IREC Solar Seminar - State Solar Policy Trends

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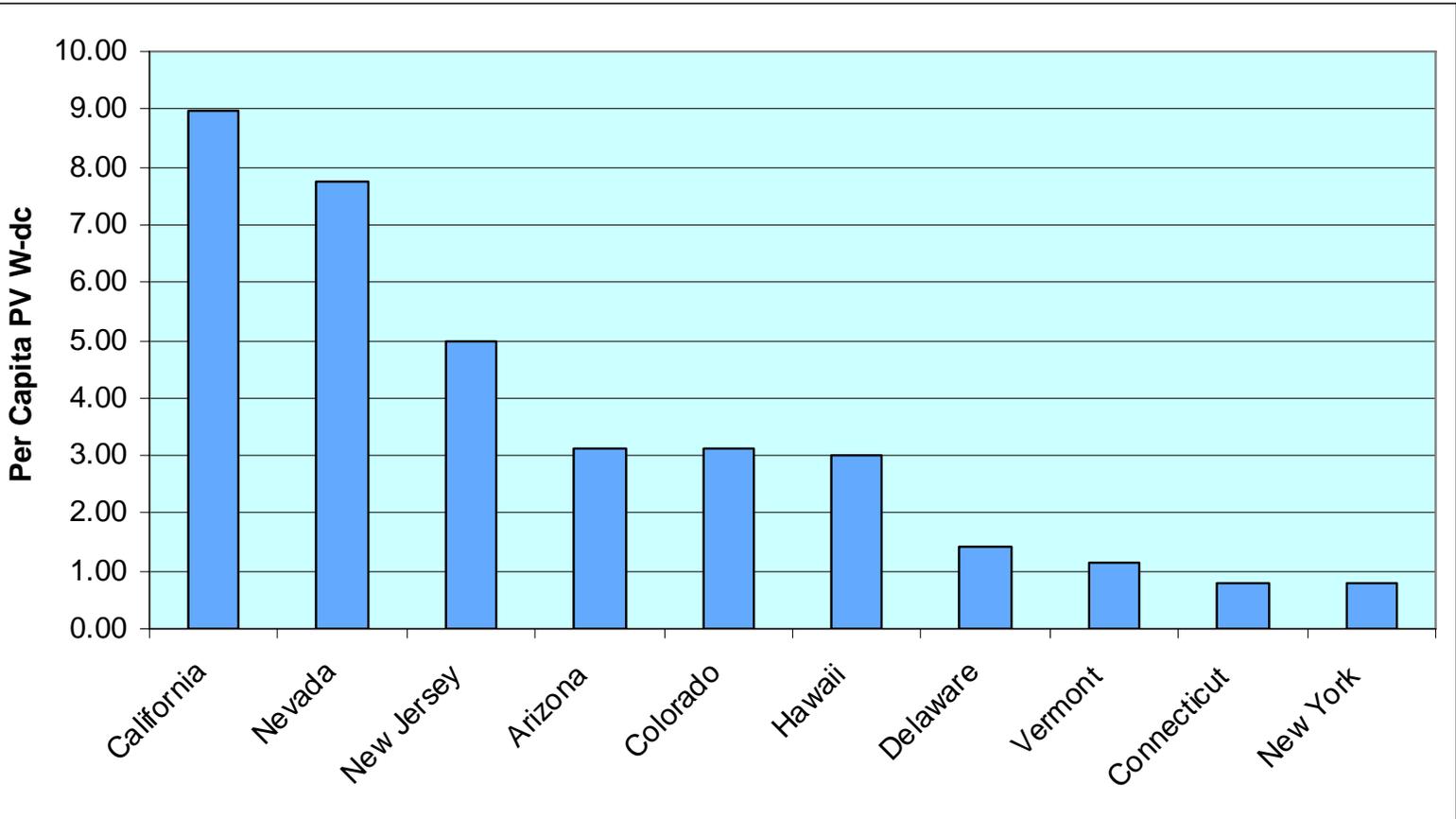
Top States for PV Installations in 2006 (Grid-Connected)

	2006 (MW)	2007 (MW)	06-07%	Incentives Paid in 2007
California	69.5	87.1	25%	\$198.1 million
New Jersey	17.9	19.2	7%	\$ 64.5 ⁽¹⁾
New York	2.9	4.4	52%	Not available
Nevada	3.2	14.6	356%	Not available
Arizona	2.1	2.8	33%	Not available
Massachusetts	1.5	1.4	-7%	\$ 5.4 million
Colorado	1.0	12.5	1150%	\$ 3.5 million
Texas	0.6	0.7	20%	\$ 14.8 million
Connecticut	0.7	1.8	157%	\$ 7.7 million
Oregon	0.5	1.1	120%	\$ 1.9 million
All Others	3.0	4.4	47%	IREC, March 08
TOTAL	103.0	151.7	47%	

(1) Incentives in addition to Solar-REC



Top 10 States for Cumulative Per Capita PV





Why States are Supporting Solar

- **PV – a growing success because of state incentive programs**
 - High visibility
 - Most practical technology for residential sector
 - Desirable in long-term capacity mix – energy security, fuel diversity, environment, peak coincidence



Barriers Facing States in Mainstreaming Solar

- **Public's lack of knowledge and confidence in solar technology**
- **Large initial investment**
 - Residential systems average \$35-\$40k
 - Commercial systems: \$50k to \$6 mm
- **Lack of streamlined interconnection standards and best permitting practices**



State Solar Policy Tools

- State incentives – capital rebates or performance-based incentives
 - More than 30 states with solar incentives
 - Funded by system benefit charge
 - “Come & Get It” approach
- Simplified interconnection standards, net metering, and rate structures that reward solar production during critical peak periods
- Exemption from state and local property taxes
- RPS & Renewable Energy Credits create new demand and revenue streams
- www.dsireusa.org provides database of incentives



State Solar Program Objectives

- **Encourage PV system cost reductions through increasing manufacturing volume, with progressively lower levels of public support needed**
- **Directly engage public with minimal transaction costs**
- **Set incentive level right**
- **Encourage PV system performance**
- **Build local market infrastructure**





Common State PV Support Programs

- Buy-down programs (most states)
- Low interest loans (NJ, OR)
- Technical support (WI, NY)
- Installer training/certification (NY)
- High-value PV installations (NY)
- Low income housing (MA, CA, NJ)
- Funding of PV manufacturers (MA)
- Marketing (CA)





Characteristics of Effective Solar Incentive Programs

○ Incentives

- Sufficient scale to drive investment:
 - CA 3000 MW by 2017
 - NJ 1500 MW by 2021
 - MD 1400 MW by 2022
 - NY 100 MW PV and 1100 SHW by 2011
- Long-term program with rational phase-out plan so market can plan
- Decrease incentives over time
- Grow local infrastructure: lower costs of marketing, distribution, installation
- Kick-start financing programs





Leading State Solar Programs

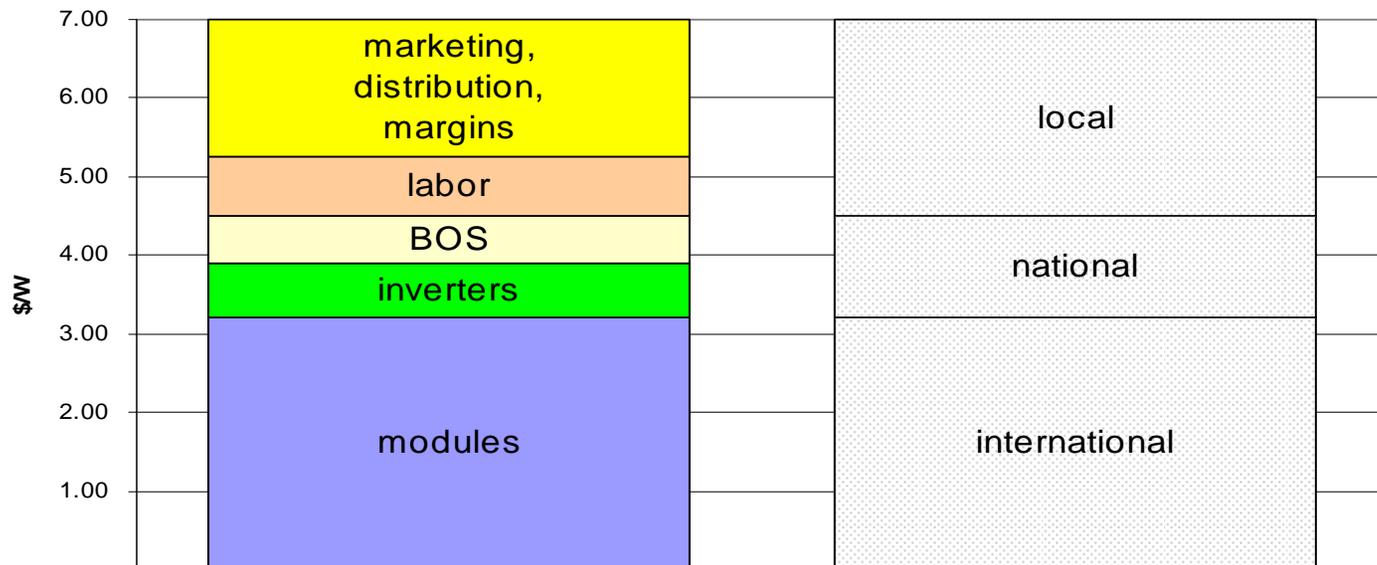
<i>State</i>	<i>Incentive</i>
Arizona	\$2 - \$3/W system rebate
Massachusetts	\$2+/W <10kW, \$2.25+ >10kW rebate
Colorado	\$2/W rebate + \$2.50 REC payment
New Jersey	\$3.80/W to \$4.40/W rebate + SREC payment
New York	\$4/W to \$4.50/W rebate
California	\$2.50/W (\$2.60 new homes), expected performance-based payment, 10% declining block incentive



State Program Strategic Bet: Reduce Non-module Costs

- Incentive programs can drive down non-module costs
- LBL study found that, in CA, non-module costs dropped \$0.30/W/yr from 1998 – 2005

30-50% Local Content



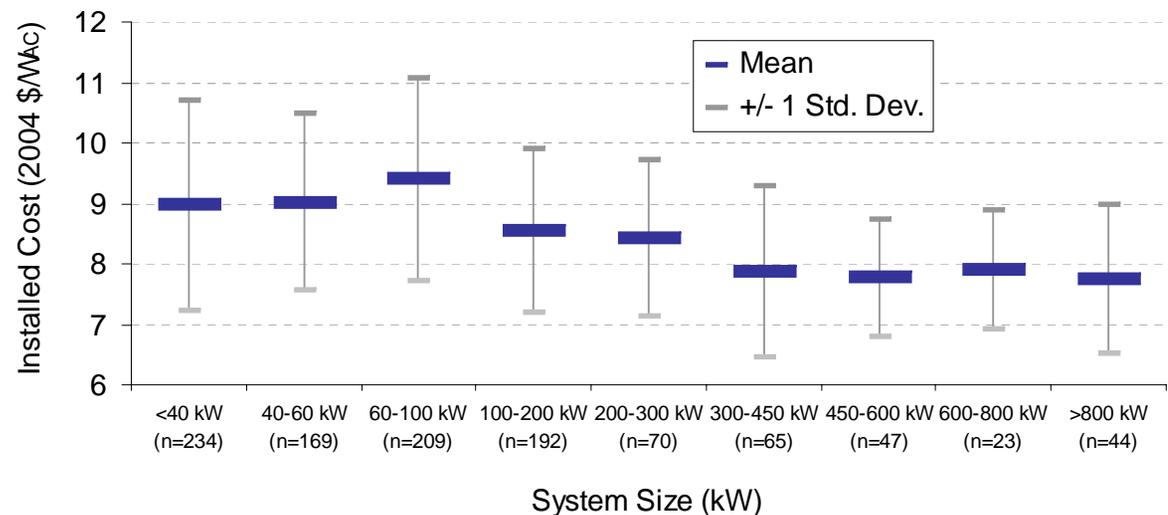
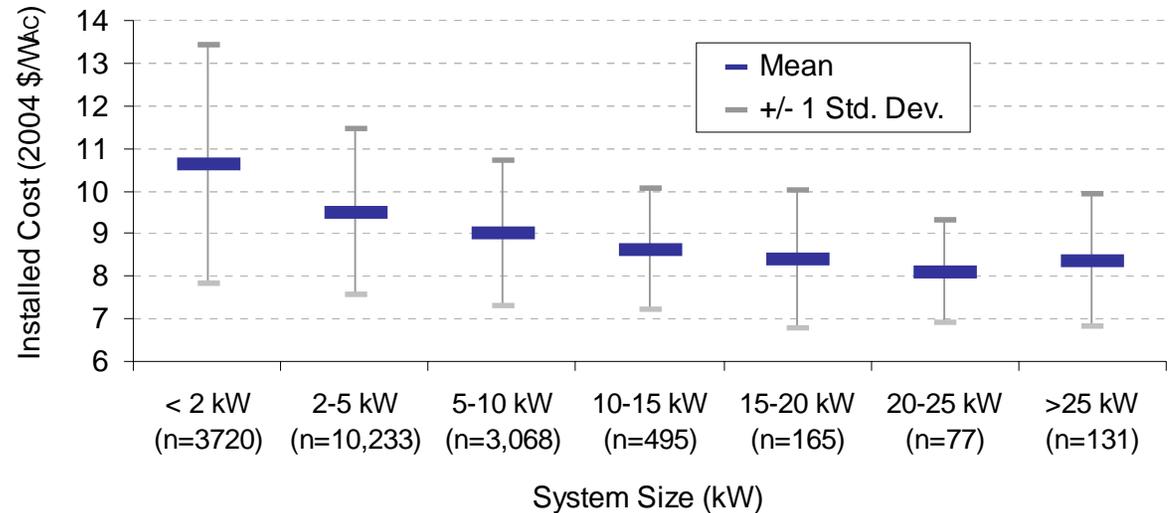
California Experience: Economies of Scale Have Driven Down Costs as System Size Increases

CEC

Largest systems are
~\$2.5/W_{AC} cheaper, on
average, than 1 kW
installations

CPUC

Largest systems are
~\$1.5/W_{AC} cheaper, on
average, than smaller
installations funded by
the CPUC





Systems Installed in Bulk in New Construction Have Had Substantially Lower Costs

Compared to the general retrofit market, certain applications demonstrate higher, or lower, average installed costs

Application Type	Number	Relative Cost
Large new residential developments	1,946	↓ \$1.2/WAC
Single new homes or small clusters	771	↑ \$0.18/WAC
Affordable housing projects	340	↓ \$1.9/W _{AC}
Schools	60	No Impact



Policy Implications

Reducing non-module costs should be a primary goal of local PV programs

- Unlike module costs (which are set in a worldwide market, and passed through directly to customers), non-module costs may be affected by local programs
- Policymakers should consider programmatic activities aimed specifically at improving the PV installation infrastructure and driving down non-module costs
 - Examples: encourage “plug-and-play” standardized products; provide consumer tools to evaluate costs and select suppliers; help remove regulatory and technical barriers; support installer training and certification; encourage system performance; focus on new construction



Policy Implications

Sustained, long-term programs may enable more significant cost reductions

- Cost reductions in CA are significant, but experience from Japan demonstrates that a sustained, long-term program may yield greater reductions
- Annual average cost declines from 1999 through 2004 were greater in Japan (8.9%) than in California (5.2%) for similar-sized residential systems



Policy Implications

The structure and size of PV incentives should encourage cost reduction, not cost inflation

- Though rich incentives may initially be required to jump-start the market, over time those incentives should decline (CA's experience shows that rich incentives can result in increased costs)
- Carefully analyze the incentives available to PV systems to ensure that they provide an adequate but not overly-rich payback; impact of federal ITC should be more closely evaluated



Policy Implications

Targeted incentives that account for the relative economics of different systems may be appropriate

- Significant cost variations by system size, application type, and installer type suggest that a further targeting of incentives may be appropriate
- This may be especially true with Federal ITC, which offers incentives whose value is highly variable by system size and customer type



Specific State Solar Approaches: New York State

- **NYSERDA multi-faceted strategy:**

- Build sustainable markets for PV
- Consumer & installer tools, information
- Create quality installer workforce:
 - nationally certified installers
 - nationally accredited training
- Support businesses to manufacture, distribute, service and install PV systems
- Incentives to stimulate demand





New York Energy \$mart Loans

- **Provide low-cost way to finance solar projects**
- **Interest rate reduction up to 4%, 10 years**
- **Secured and unsecured loans available**





MA Commonwealth Solar

- Eligibility: residential, commercial, industrial, public buildings
- Funding available: \$68 million total through 2011. Set asides of \$16 million for projects on MA public buildings and \$8 million for residential PV installations

<http://www.masstech.org/solar/CommSolarProgramManual.pdf>



MA Commonwealth Solar

Residential Rebates (\$ per watt (dc))	
Base Incentive	\$ 2.00
Massachusetts Company Components Adder	\$ 0.25
Moderate Home Value Adder	\$ 1.25
Moderate Income Adder	
≤ \$91,552 (120% of MA median household income)	\$ 1.00
≤ \$76,296 (MA median household income)	\$ 2.00

Non-Residential Rebates for Incremental Capacity (\$ per watt (dc))				
Incremental Capacity	First: 1 to 25 kW	Next: > 25 to 100 kW	Next: > 100 kW to 200 kW	Next: > 200 kW to 500 kW
Base Incentive	\$3.25	\$2.50	\$2.00	\$1.50
<i>PLUS: Additions to Base</i>				
Massachusetts Company Components Adder	\$0.25	\$0.25	\$0.25	\$0.25
Public Building Adder	\$0.50	\$0.50	\$0.25	\$0.25



New Jersey Solar RPS

- NJ – a national leader
- Fastest growing state solar market
 - Generous rebates
 - Best state rules on net metering
 - Solar REC revenues
- Ambitious RPS Solar Set-aside
 - 2.12% of electricity use from solar by 2021; 1500MW
- Rebate popularity: program too expensive





New Jersey's New Solar Financing Approach

- NJ adopts solar REC-based financing program
- Goal: phase out rebates in favor of market-based financing program
- De-couple solar program from annual state budget fights
- Retain rebates only for small systems
- Set 8-year, competitive Solar Alternative Compliance Payment
 - Increase investor certainty in solar REC market
 - Reduce regulatory risk that state will change RPS rules

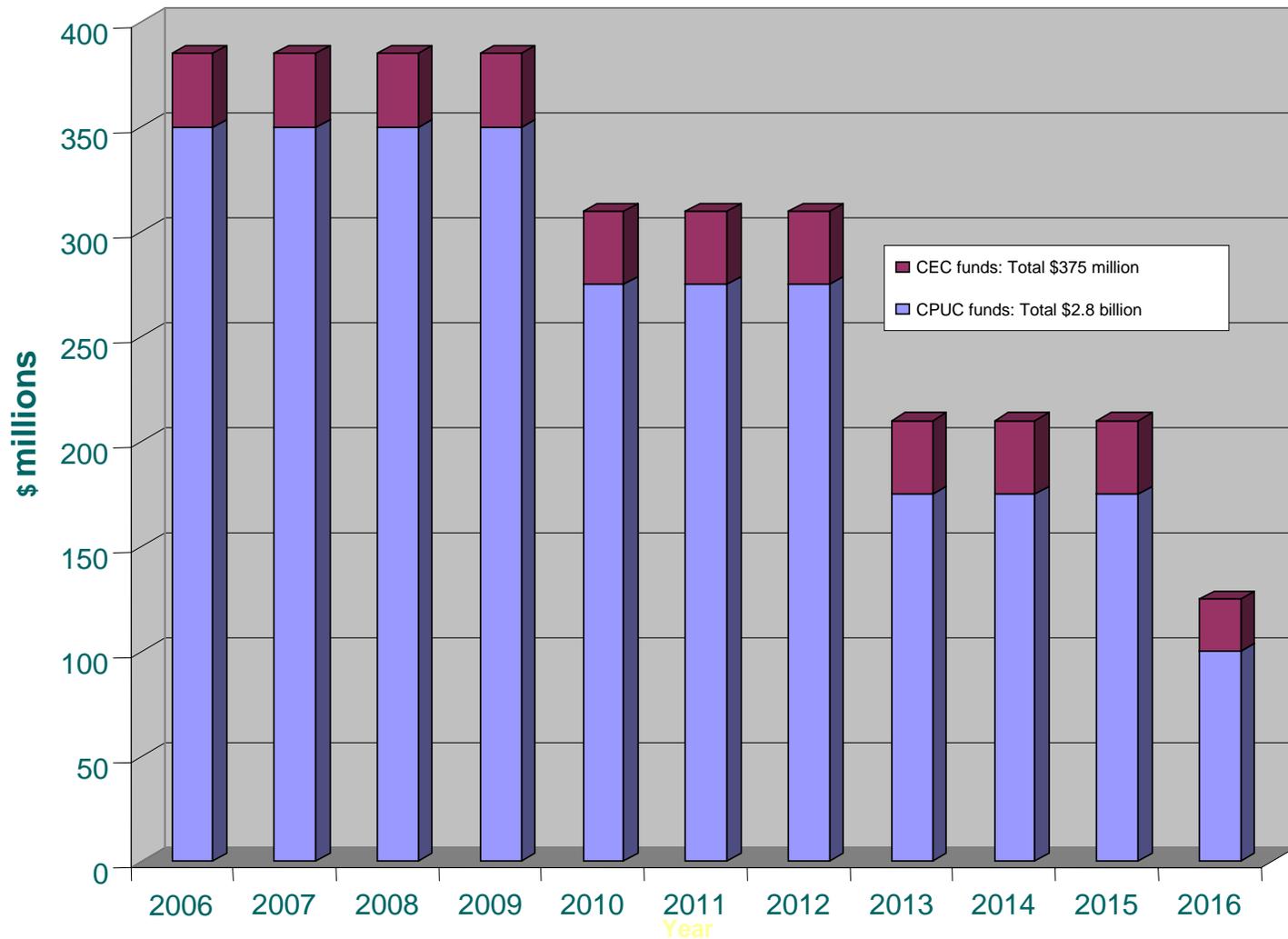


California Solar Initiative

- **Ambitious:** 3000 MW goal
- **Comprehensive:** combined utility, PUC and CEC effort
- **Regulatory Bargain:** 10 year, declining incentive structure for solar industry to become self-sufficient
- **New Home Emphasis:** solar on 50% of new homes; 50+ home developments must offer PV as option in 2011
- **Reward System Performance:** transition to performance-based incentives
- **Leverage Energy Efficiency:** exceed building standards to receive incentive



CA Solar Initiative (CSI) Funding





New Directions for State Solar Programs

- **Primary goal of incentive programs: encourage cost reductions**
- **Traditional solar buy-down programs: not driving cost reductions fast enough**
- **States now targeting incentives to encourage high value applications**
 - Using solicitations and differing incentive levels
 - Targeting large new residential & affordable housing projects with lower average installed costs and economies of scale



New State Focus: Solar on New Homes

- **Advantages of residential new construction**

- Better performance (no shading, proper orientation)
- Easy to roll solar costs into mortgage
- Lower up-front costs (bulk purchases, standardization)

- **But also unique barriers**

- Builders risk averse to new technologies
- Builder concerns:
 - Impact on home prices & profits
 - Scheduling delays
 - Perceived lack of interest by homebuyers



Emerging State Strategies: PV on New Homes

- **Target adequate program funding to large homebuilders**
 - CA New Solar Homes Partnership

- **Provide higher incentives for new homes**
 - MA, NJ, NY provide higher incentives for BIPV and PV on high efficiency homes

- **Adopt builder-friendly program rules**
 - CA, NJ & MA provide longer reservation periods
 - CA simplifies documentation



State Strategies: PV on New Homes

- **Fund outreach to building professionals**
 - NYS funds training for builders, lenders, appraisers, inspectors
 - Oregon and Wisconsin conduct builder outreach
- **Other state program strategies**
 - Builder mandates
 - Financing programs
 - Entitlements for local permitting
- **See [LBNL/CESA case study](#): *Supporting PV In Market-Rate Residential New Construction* (2006)**



Targeting PV Support for Affordable Housing

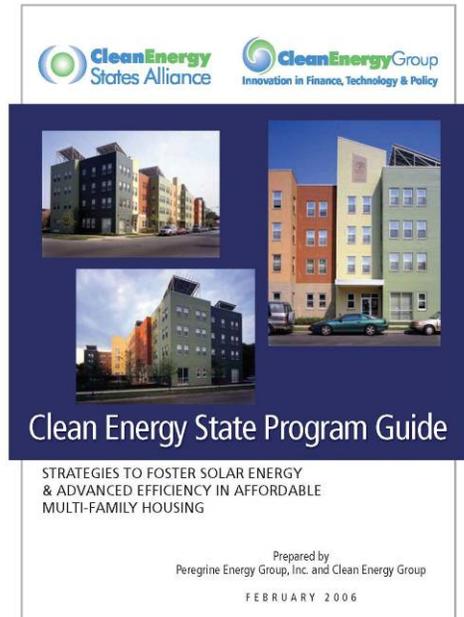
○ Why?

- Most cost effective residential installation
- Social equity
- Highly visible context

○ Keys to Success

- Partner with state housing agencies
- Offer larger subsidies
- Award extra housing tax credit points
- Get involved in design process early

○ NJ SUNLIT Program; MA Green Communities Partnership; CSI



www.cleanenergystates.org



Solar Hot Water: Heating Up

- Increasing state interest in solar hot water
- Ohio, Wisconsin, Oregon, and CA now targeting
- Why?
 - Stable technology, material improvements, high efficiency
 - New rating system for consumers
 - More attractive designs
 - SWH saves more natural gas than any other technology
 - Less expensive than solar PV with shorter paybacks
- Best in Class: Energy Trust of Oregon
 - 193 residential SHW installations in 2007; 30,300 therm and 293,400 kWh of savings. Average incentive was \$1,000.

<http://www.energytrust.org/RR/SWH/index.html>



Emerging State Interest in Feed-in Tariffs

- **California:** recent CEC workshop
- **Massachusetts:** new Administration considering merits of FIT
- **New Jersey:** tariff considered as policy option
 - Tariff had lowest ratepayer impact but ...
 - lack of utility support, difficult to set tariff at appropriate level, PURPA conflict



DOE Solar America Initiative – CESA State Solar Technical Outreach

- **3-year initiative to assist states to advance solar**
 - CESA partnership with Council of State Governments
- **Objectives:**
 - Provide information & technical assistance to states for new & expanded solar programs
 - Identify & foster adoption by states of solar best practices
 - Pursue strategic opportunities for states & DOE to advance solar



Observations & Recommendations

- **Solar PV is a growing success because of state government support programs**
- **If you choose to subsidize PV:**
 - Long-term program with rational phase-out plan (e.g., Japan, Germany)
 - Clear, transparent, customer-friendly rules
 - Sensible program design
 - Long term financing
 - Walk the Talk: state buildings
 - Training



Contact Information

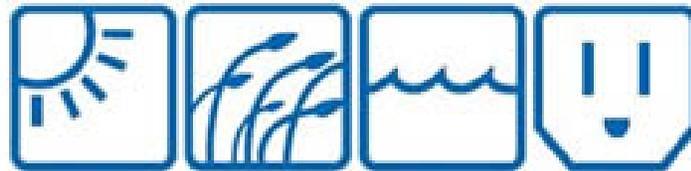
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