
Solar in San Diego: Potential, Progress, Policy, and Prognosis

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Energy Policy Initiatives Center



Presentation Overview

- Solar Potential Study
- Current Progress in San Diego
- Policy Update
 - CA Legislation
 - CA Regulatory Issues
 - Energy Policy Act of 2005
- What does the future hold?

Technical Potential Study

■ Participants:

- ❑ Resley Consulting
- ❑ Rohy Consulting Associates
- ❑ SDG&E
- ❑ SDREO
- ❑ SDSU
- ❑ Tanaka Research and Consulting
- ❑ Universidad Autonoma de Baja California (UABC)

Technical Potential Study

- Goal: Determine the technical potential for renewable energy in the San Diego region
 - Some data for Baja California and Imperial County included
- Result: Significant potential exists!!
- For Details on the Study:
www.renewablesg.org

Technical Potential Study

- Solar Technologies Included
 - Photovoltaics (PV)
 - Residential
 - Commercial
 - Concentrating Solar Power (CSP)
 - Utility scale
- Chapter Estimates
 - Capacity
 - Energy

PV Technical Potential

Table 2.1: Technical Potential of PV Systems in San Diego County

	Capacity (MWAC) ¹			Energy (GWh)		
	Today ²	2010	2020	Today	2010	2020
Potential PV:	Today ²	2010	2020	Today	2010	2020
Residential	2,539	2,772	2,965	5,782	6,310	6,756
Commercial	1,575	1,624	1,726	3,165	3,263	3,468
Total Technical Potential for PV	4,114	4,396	4,691	8,947	9,573	10,224
Potential PV Market Penetration:						
1%	41	44	47	89	96	102
5%	206 ³	220	235	447 ⁴	479	511
10%	411	440	469	895	957	1,022

¹ Capacity is defined as nameplate peak power rating

² May 2005 SDG&E's existing PV grid-connected installation is 12.6 MW which equates 0.31% of SDG&E's peak demand

³ 5.1% of SDG&E's peak demand using a 2004 peak of 4,065 MW

⁴ 2.4% of SDG&E's 2004 total energy sales of 19,000 GWh

As of August 31, 2005 there are 2703 systems representing 16.5 MW

PV Potential: Residential

Table 2.7: Residential Market Penetration Rates

Market Penetration	Capacity (MW)			Energy (GWh)			% of RES Goal*	
	Existing and New Construction							
	2003	2010	2020	2003	2010	2020	2010	2020
1%	25	28	30	58	63	68	1.8%	1.0%
5%	127	139	148	289	316	338	4.6%	4.9%
10%	254	277	296	578	631	676	18.4%	9.9%

*RES renewable energy goal is 12% by 2010. Calculation based on projected 2010 SDG&E energy sales of 2,820.
 **RES renewable energy goal is 25% by 2020. Calculation based on projected 2020 SDG&E energy sales of 27,327

As of August 31, 2005 there are 2,562 systems representing 7.9 MW

PV Potential: Commercial

Table 2.9: GIS Analysis Results for SD City Buildings

Class	Rank	Available Roof Space	Number of Buildings	Total Estimated Usable Area (Acres) *	Estimated PV Capacity (MW-DC)	Estimated PV Capacity (MW-AC)	Estimated Annual Energy Production (GWh)
1	Good	80%	9,755	2,053	894	599	1,194
2	Fair	60%	5,158	574	250	167	333.70
3	Poor	20%	244	8	4	2	4.85
Totals			15,157	2,635	1,148	769	1,532

*This number includes the 20% reduction for shading and roof structure variations

PV Potential: Commercial

Commercial Technical Potential Summary

Year	MW ac	GWh
2005	1,575	3,165
2010	1,624	3,263
2020	1,726	3,648

PV Potential: Commercial

Table 2.11: Commercial PV Capacity at Various Penetration Rates

Market Penetration	Capacity (MW)			Energy (GWh)			% of RES Goal	
	2005	2010	2020	2005	2010	2020	2010*	2020**
1%	16	16	17	32	33	35	0.95%	0.51%
5%	79	81	86	158	163	173	4.77%	2.54%
10%	157	162	173	317	326	347	9.53%	5.08%

*RES renewable energy goal is 15% by 2010. Calculation based on projected 2010 SDG&E total sales of 22,820.

**RES renewable energy goal is 25% by 2020. Calculation based on projected 2020 SDG&E total sales of 27,327.

As of August 31, 2005 there are 141 systems representing 8.5 MW

Photovoltaics Impacts

- Impacts on Peak
 - Adding PV lowers/shifts forward peak
 - Study looked at how much PV it would take to shift peak one hour
 - Each increment of PV has a diminished on peak reduction
 - Peak reduction more significant with reliable and efficient storage

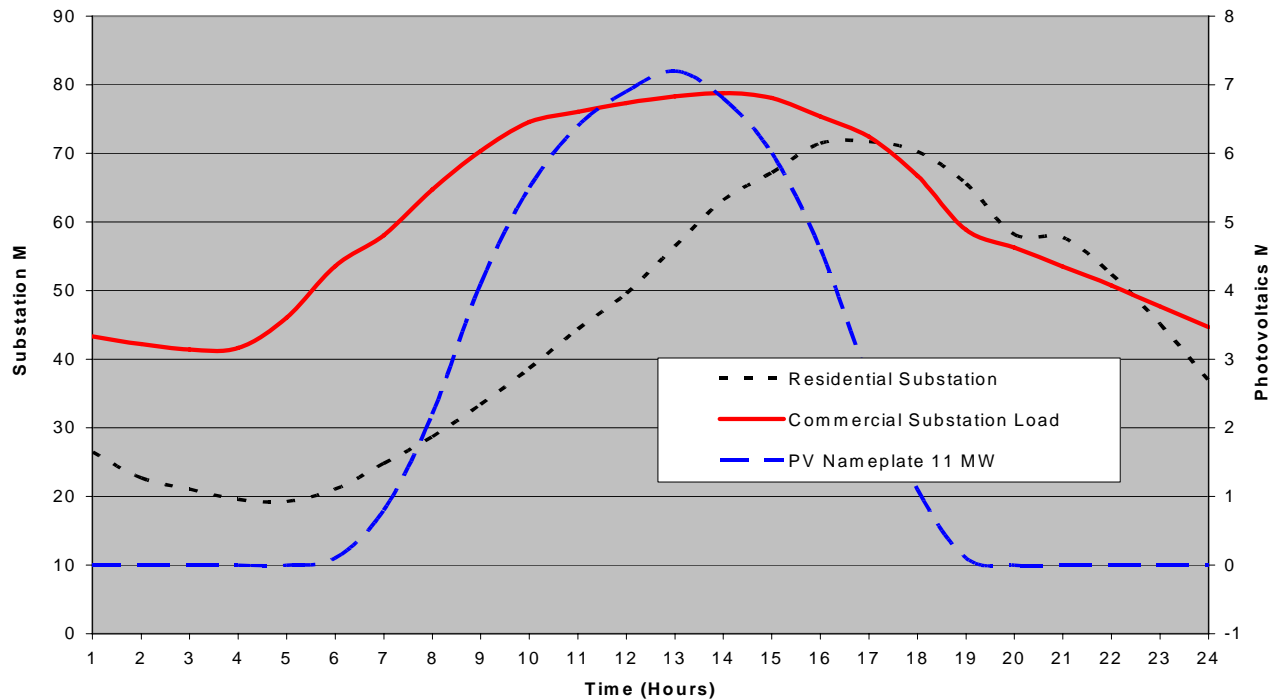
PV Impacts on Peak

- How much PV required to shift peak by 1 hour?

System Peak Hour	System Peak MW	PV Needed MW	PV Peak Reduction MW	Reduction as % of Total PV
3pm	3957			
4pm	3923	63	34	54%
5pm	3827	231	96	42%
8pm	3588	960	239	25%
Cumulative MW		1254	369	29%

Photovoltaics Impacts

Figure 2.6 Impact of 11 MW on a SDG&E Commercial and Residential Substation Peak Load

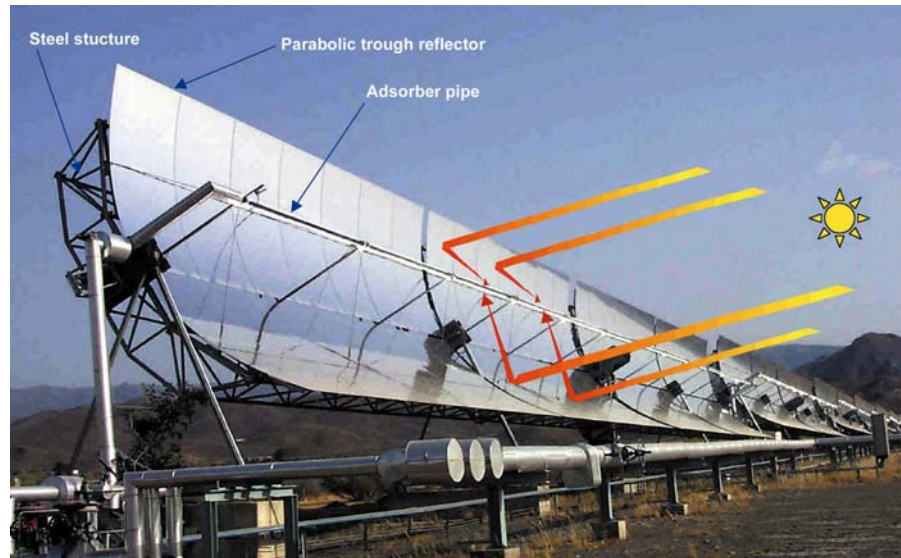


Photovoltaics Impacts

- Impacts on Substations
 - PV production matches well with typical commercial substation peak load
 - 2 PM peak
 - PV produces 62% of nameplate
 - 16.5 MW of PV would reduce peak demand by 10.2 MW
 - PV production contributes less to residential peak loads.
 - 5 PM peak
 - PV produces 25% of nameplate
 - 16.5 MW of PV would reduce peak by 4.1 MW

Concentrating Solar Power (CSP)

- CSP concentrates the sun's rays to heat a working fluid to create steam for a steam turbine/generator.



Concentrating Solar Power (CSP)

- The CSP collectors track the sun.



SEGS III Solar Plants at Kramer Junction, CA

Concentrating Solar Power

- Estimates based on NREL report
 - Obtained refined land use values
- Applied additional filters
 - Undeveloped Non-Agriculture Land
 - Refined 1% slope
- SD Region Study Group Estimates
 - Borrego Springs 2.9 GW (58 km²)
 - Imperial County 29 GW (580 km²)

Solar Water Heating Potential

- Kema-Xenergy Study
 - Highest potential for natural gas savings
 - Highest levelized cost
- San Diego Region Potential
 - SDREO completed preliminary work
- No Centralized Data for Solar Water
 - No permits required for pool heating
 - Permit records at 19 jurisdictions
 - No single conduit (like the IOU with PV)
- 2005 Title 25 Could increase use of solar water

World Leaders in PV

- Germany 366 MW in 2004
- Japan 277 MW in 2004
- CA – 100 MW
 - San Diego has much more sun than Germany!



Sources: CEC, solarbuzz.com

World Leaders in PV

- Juneau, AK 58° 37'N
- Vancouver, BC 49° 16'N
- Munich, Germany 48° 03'N
- Sacramento, CA 38° 05'N
- Tokyo, Japan 35° 41'N
- San Diego, CA 32° 82'N

World Leaders in PV



Vancouver, BC
is about here

Here is
Munich!

PV in San Diego

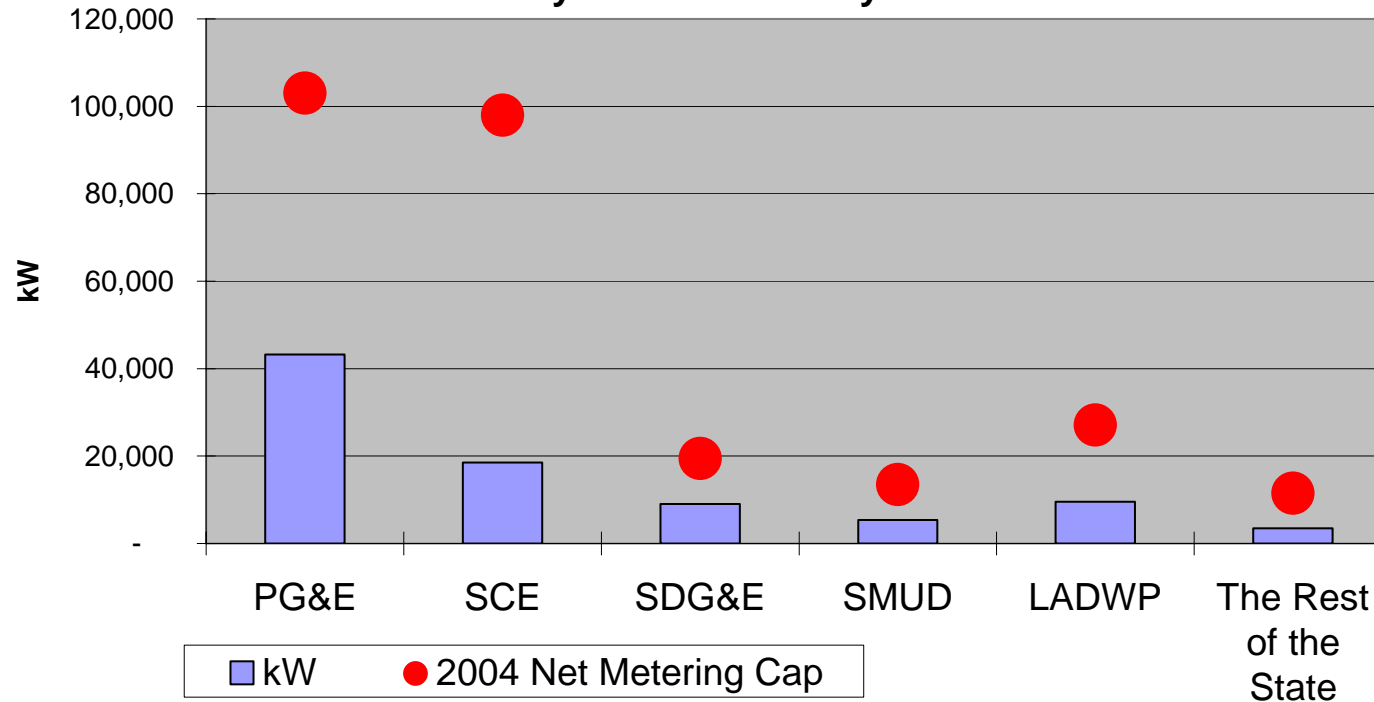
- San Diego is Leading the Way in CA
 - The SD region has more PV as % of Peak demand than any other IOU territory in CA!

	# Systems	MW
Installed	2,703	16.5
<i>Pending</i>	484	3.9
Total	3,187	20.4

Source: SDG&E, Date through August 31, 2005

San Diego v. Other Areas

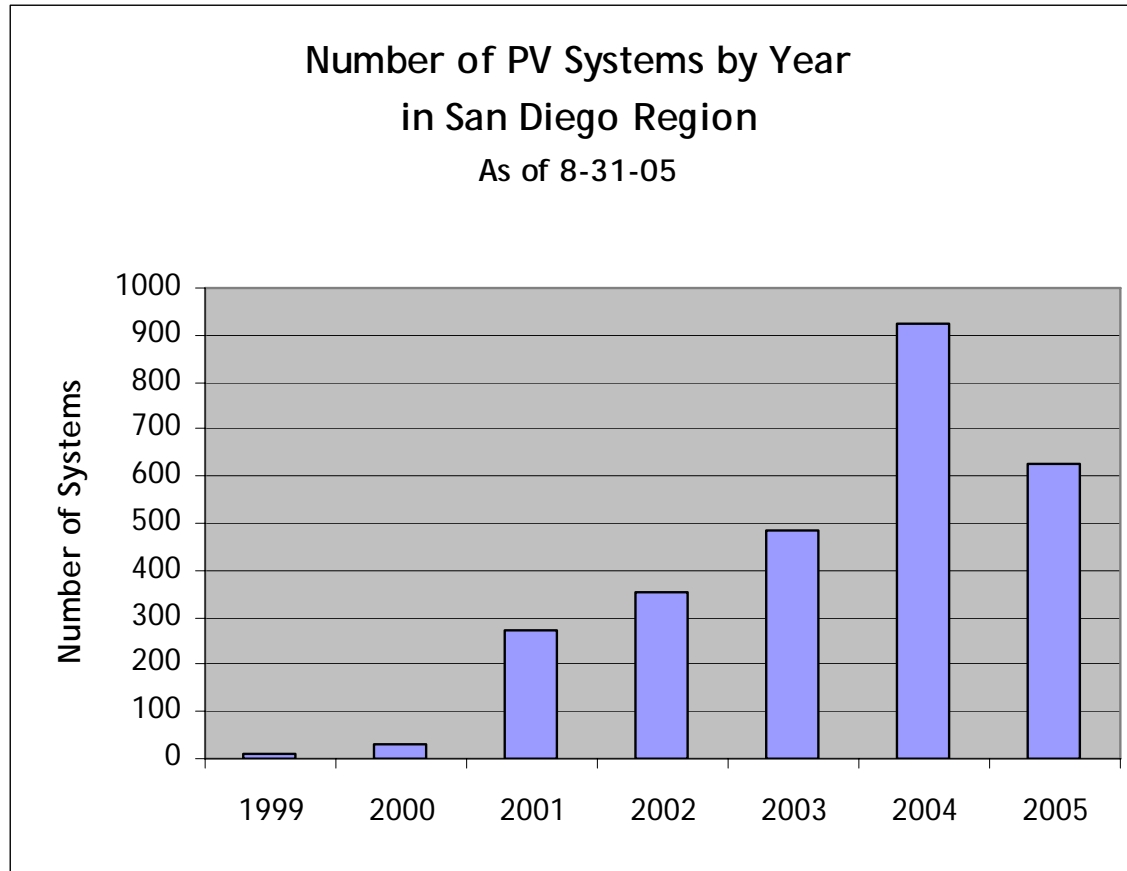
**Estimated Net Metering Caps and
Grid-Connected PV Capacity Installed in California
by Service Territory**



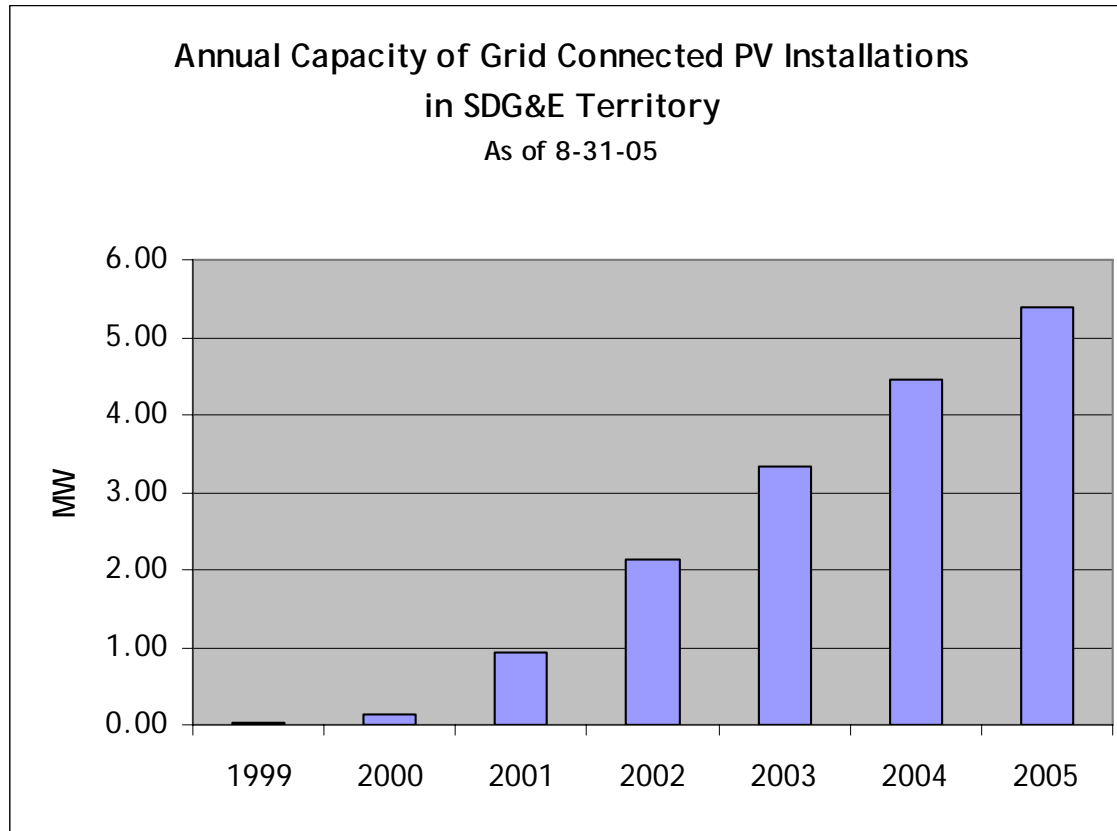
LADWP is exempted from the AB 58 net metering provisions. However, an estimated cap is provided for LADWP as if the cap did apply to them.

Source: CEC

PV Installations in San Diego



PV Installations in San Diego



PV in San Diego

- Many more residential systems
- Commercial is largest sector
 - Recently overtook residential sector

Sector	Systems	Capacity (MW)
Residential	2,562	8.0
Commercial*	141	8.5
Total	2,703	16.5

*Commercial sector includes systems >10 kW

California Legislation

- SB1 (Murray) – Failed
 - Would have created Million Solar Roofs Initiative
 - Is there life after SB1?...
- SB 816 (Kehoe) – Passed
 - Increased the net metering cap in San Diego to 50 MW
- AB 1099 (Leno) –Passed
 - Extends property tax exemption for solar installations to 2008-2009

California Regulatory Update

- Distributed Generation Proceeding (R.04-03-017)
 - SGIP Cost Effectiveness Ruling
 - Reprioritize the wait lists based on cost-effectiveness
 - Recognizes “market transformation” value of DG
 - Participant test used to reduce freeridership
 - Itron SGIP Cost Effectiveness Results
 - Preliminary cost effectiveness is low for SGIP
 - 0.48 to 0.59
 - PV had the lowest rating in 3 of the 4 measures
 - 0.23 to 0.27

Energy Policy Act of 2005

- Business Energy Tax Credit (§1336, §1337)
 - Credit Value
 - 10% for microturbines, geothermal
 - 30% for all other technologies
 - Certain caps apply
 - Eligible Taxpayer
 - Commercial taxpayers installing eligible equipment
 - Eligible Equipment
 - PV, solar water (not pools), fuel cells, microturbines, and solar hybrid lighting
 - Expiration Date
 - Expires 12-31-07
 - Reverts back to 10% Business Tax Credit

Energy Policy Act of 2005

Business Energy Tax Credit Caps

Technology	Credit	Cap
Fuel Cells	30%	\$500/0.5 kW
Microturbines	10%	\$200/kW
Photovoltaics	30%	No cap
Solar Water Heating	30%	No cap
Solar Hybrid Lighting	30%	No cap
Geothermal	10%	No cap

Energy Policy Act of 2005

- Residential Solar/Fuel Cell Credit (§1335)
 - Credit Value
 - 30% of equipment cost
 - \$2,000 cap for PV and solar water heating
 - \$500/0.5kW cap for fuel cells
 - Eligible Taxpayer
 - Residential taxpayers installing eligible equipment
 - Eligible Equipment
 - PV, solar water (not pools), and fuel cells,
 - Expiration Date
 - For residential property placed in service after December 31, 2005 but on or before December 31, 2007.

Is there life after SB1?...

- CA 7.5% tax credit expires 12-31-05
- 30% Federal tax credits kicks in 1-1-05
 - More like 10-15% on residential systems
- SGIP
 - Funding shortfall
 - Wait list issue
 - Application fee freed up some funding
- CEC Emerging Renewables Program
 - \$55.6 million remaining for 30 kW and below
 - Lackluster performance-based pilot (\$8.7 million left)
- Net Metering head room in other areas of CA

...Look to the CPUC for Help

- CPUC likely to issue decision on CA Solar Initiative (CSI)
 - CSI joint CEC/CPUC staff report
 - Key pieces of the puzzle in place for a decision
 - Comments submitted
 - Public record developed
 - Best Guess – Decision in January 2006
 - It will be very tight to have a decision out by the end of the year...but it is possible

CA Solar Initiative

- Some Issues to consider:
 - Cost effectiveness
 - What is the best way to use the ITRON results?
 - Cost effectiveness as an eligibility criterion?
 - Total amount of incentives
 - How much funding is just right?
 - A previous ruling had \$300 million annually for SGIP
 - with \$216 million annually for PV
 - Incentive level
 - What is the magic level for PV?
 - Is \$3.50 too high?
 - Look for a lower rebate level for PV
 - Mechanism to adjust rebate level is needed
 - Must be able to respond to market conditions

CA Solar Initiative

- CPUC Flexibility
 - CPUC relatively slow to react and change program
 - Need mechanism to allow CPUC to act nimbly on SGIP
- Public Input
 - More public meetings and workshops needed
 - More avenues for stakeholder input
- Residential Program Integration
 - Should there be two programs: SGIP and ERP?
 - Programs should be consolidated
 - SDREO's Rebuild a Greener San Diego is a model for how to integrate residential into SGIP
 - Blend of CEC ERP and SGIP rules and procedures

CA Solar Initiative

- Performance-based Incentives
 - Very likely in our future
 - PBIs accomplish several positives:
 - maximize kW impact per dollar invested
 - help ensure that systems remain in place long enough to realize ratepayer benefits
 - improve system installation quality
- Streamlining Application Process
 - Automate the process

Conclusions

- Potential [HIGH]
- Progress [SIGNIFICANT]
- Policy [SOME SUCCESSES]
- Prognosis...

[TAKE 2 ADVIL AND CALL ME IN
JANUARY]

Thank You!

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