



Distributed Generation and California Solar Initiative: CPUC Policies and Programs

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Presentation Overview

- ❑ What is Distributed Generation?
- ❑ A Priority for California
- ❑ CPUC Distributed Generation Policy and Programs
 - Net energy metering and Interconnection rules
 - California Solar Initiative
 - General Market Incentive Program
 - PV and Non-PV solar
 - Low Income Programs
 - Research and Development Program
 - Solar Hot Water
 - Self Generation Incentive Program
 - Feed-in-Tariffs
 - Small Renewable Energy Generators
 - Combined Heat and Power
- ❑ Current CPUC Proceedings



What is Distributed Generation?

DG is:

- Generation connected at *distribution* voltage
- 1 kW to 20 MW
- Customer generation
- Voltage support
- Local reliability
- Merchant plant
- Utility plant

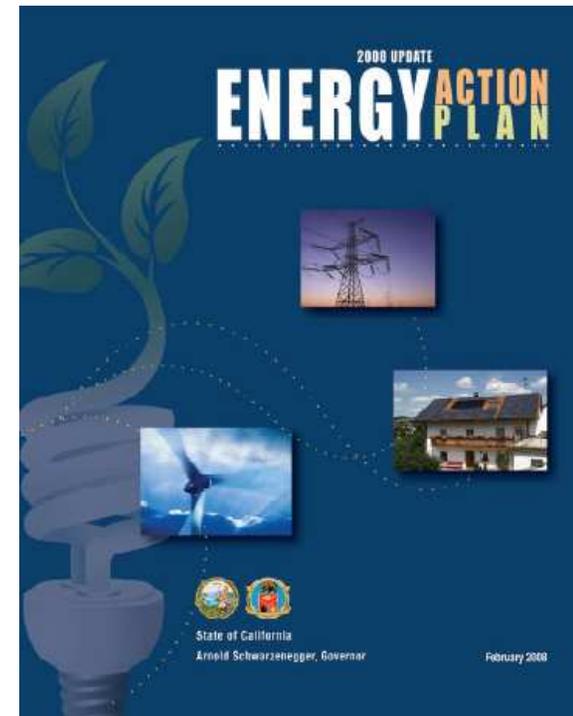
Technologies:

- Renewable
 - Solar (PV & solar thermal)
 - Wind
 - Dairy/landfill/waste biogas
 - Biomass
- Combined Heat and Power (CHP)
 - Microturbines
 - IC Engines
 - Small gas turbines
 - Fuel Cells



Why DG Matters

- Peak demand reduction
- Can enhance grid reliability
- Best DG technologies and applications reduce GHG emissions via demand side reductions
- Empowers consumers



CPUC Policy & Programs

- ❑ Net energy metering (NEM) and Interconnection Rules
- ❑ California Solar Initiative
 - General Market Incentive Program
 - PV and Non-PV solar
 - Low Income Programs
 - Research and Development Program
 - Solar Hot Water
- ❑ Self Generation Incentive Program
- ❑ Feed-in-Tariffs
 - Small Renewable Energy Generators
 - Combined Heat and Power



Interconnection and Net energy metering (NEM)

- ❑ Interconnection (Rule 21) - CA one of the first states to adopt standard interconnection, operating, and metering requirements for DG
- ❑ Net Energy Metering:
 - Customers may offset utility charges with credits from onsite power production.
 - NEM customers are exempt from standby charges and interconnection fees.
- ❑ NEM Rates:
 - *Full retail NEM* - credit based on the full retail rate (PUC Section 2827)
 - Solar up to 1MW
 - Wind up to 50kW
 - *Generation only NEM* - credit based on generation portion of the rate
 - Wind between 50kW and 1MW (PUC Section 2827.8)
 - Biogas generation up to 1MW (PUC Section 2827.9)
 - Fuel Cells up to 1MW (PUC Section 2827.10)

NEM customers statewide as of 12/31/2007

	PG&E		SDG&E		SCE		Total	
	#	MW	#	MW	#	MW	#	MW
Solar	20,501	160.0	4,840	33.3	6,708	70.4	32,049	263.7
Wind (under 50kW)*	137	0.5	7	0.0	203	1.5	347	2.1
Wind (50kW-1MW)**	-	0.0	-	0.0	1	0.9	1	0.9
Biogas	4	1.1	1	0.1	5	2.7	10	3.9
Fuel Cells**	7	4.3	3	2.0	6	3.2	16	9.5



*Estimates only - based on ERP project data; **Estimates only - based on SGIP project data

Self Generation Incentive Program (SGIP)

- **SGIP is the largest DG incentive program in the country**
 - Represents over \$1 billion in total project costs
 - As of March 31, 2008, approximately 1200 operating facilities (~300 MW of capacity)
- **Program was initiated by AB 970 (Ducheny, 2000)**
 - Started in response to California peak demand problems
 - Developed to pursue load control and distributed generation (DG)
 - DG facilities were to be located at the demand source (i.e., customer sites)
- **Program continues to evolve**
 - Solar PV moved to CSI in 2007
 - AB2778 extends SGIP through December 31, 2011, limits technologies to only wind, fuel cells
 - Recent ruling may extend incentives to advanced energy storage technologies, when used in conjunction with wind and fuel cells



SGIP Technologies & Incentives

- Eligible technologies have included both renewable and fossil fuel powered systems in the past
- Currently, only wind and fuel cells are eligible for SGIP, per statute
- Maximum system capacity = 5MW

Eligible Technology	Incentive Level \$/watt	
	2007	2008**
Solar PV*		
Wind turbines	\$1.50	\$1.50
Biogas fuel cell	\$4.50	\$4.50
Natural gas fuel cell	\$2.50	\$2.50
Biogas microturbines (MT)	\$1.30	
Biogas internal-combustion engines (ICE)	\$1.00	
Large biogas turbines	\$1.00	
Natural gas microturbines	\$0.80	
Natural gas internal-combustion engines	\$0.60	
Small natural gas turbines	\$0.80	
Large natural gas turbines	\$0.60	

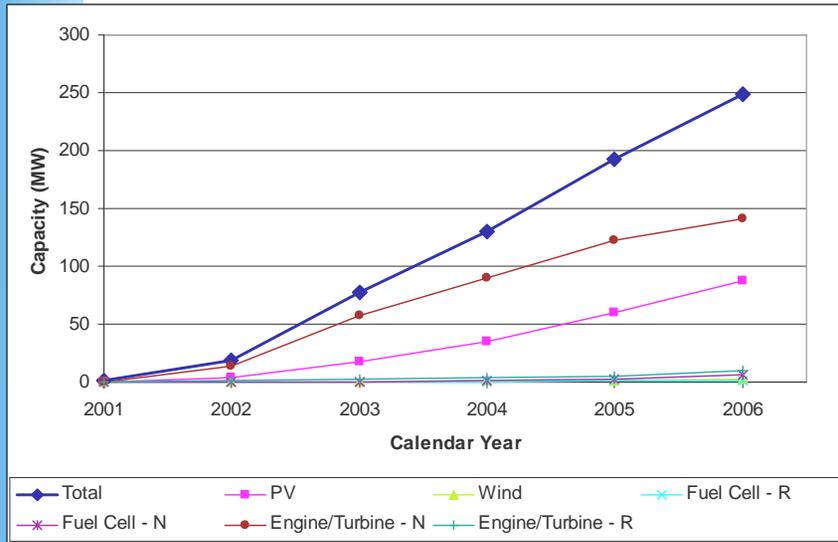


*Solar PV technologies were removed from SGIP effective 1/1/2007

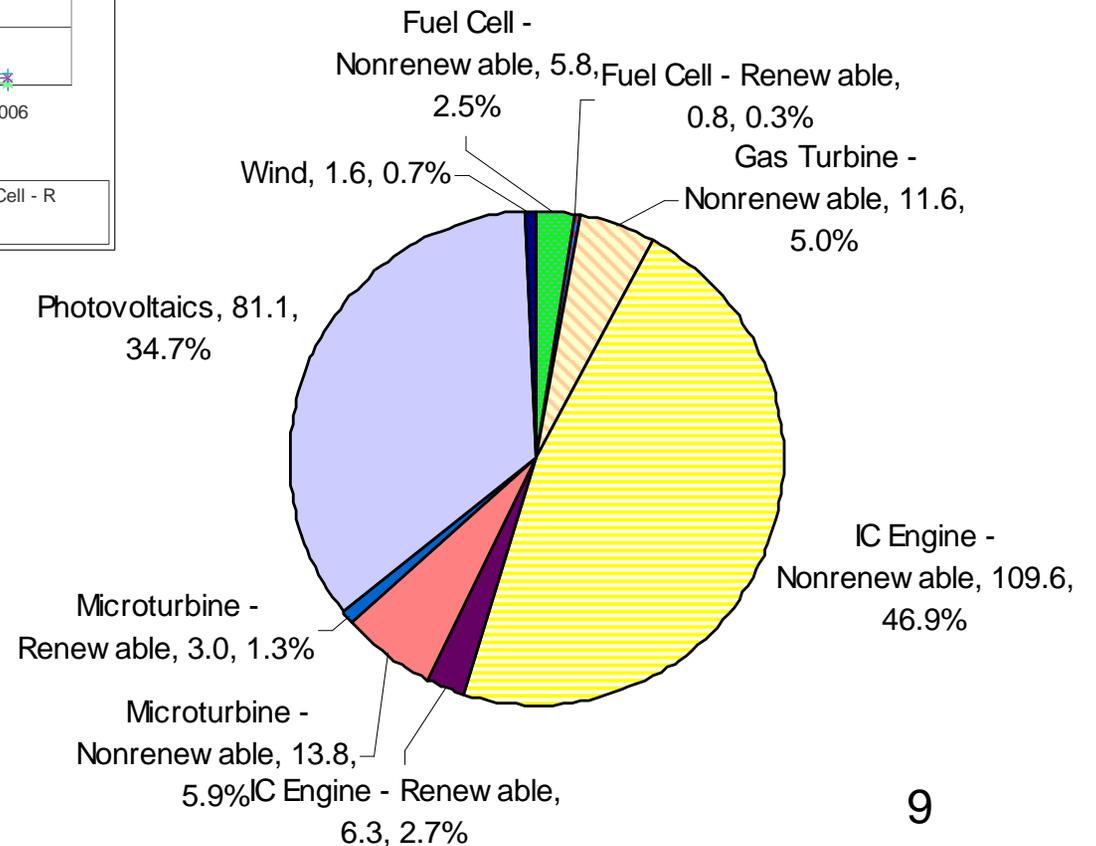
**AB 2778 limits SGIP to wind and fuel cells effective 1/1/2008

Renewable fuel
 Nonrenewable fuel

SGIP Funded Projects



Total Installed Capacity through 12/31/2006 = 223.6 MW



SGIP Program Impacts

- SGIP facilities delivered **610,000 MWh** in 2006
 - Engines/Turbines provided 78%
 - PV provided 17%
 - Represents electricity that did not have to be generated by central station power plants or delivered by transmission and distribution systems
- Over 110,000 tons of CO2 equivalent reduced in 2006
 - PV systems account for over half of all GHG reductions
 - Biogas systems provided over 58,000 tons of CO2 equivalent reductions
- Three ways SGIP funded systems reduce GHG emissions:
 - *Displace grid electricity*
 - *Methane captured and used by biogas facilities*
 - *Waste heat recovery systems used at cogeneration facilities avoid need for emissions associated with generating heat other ways*



California Solar Initiative (CSI)

☐ Statewide goals

- 3,000 MW of new distributed solar generation by 2016
- Create a self-sustaining solar industry free from ratepayer subsidies after 2016
 - Provides rebates for solar based on performance
 - Rewards optimally-sited and maintained systems to ensure performance, maximize ratepayer return on investment
 - Incentives decline based on program demand

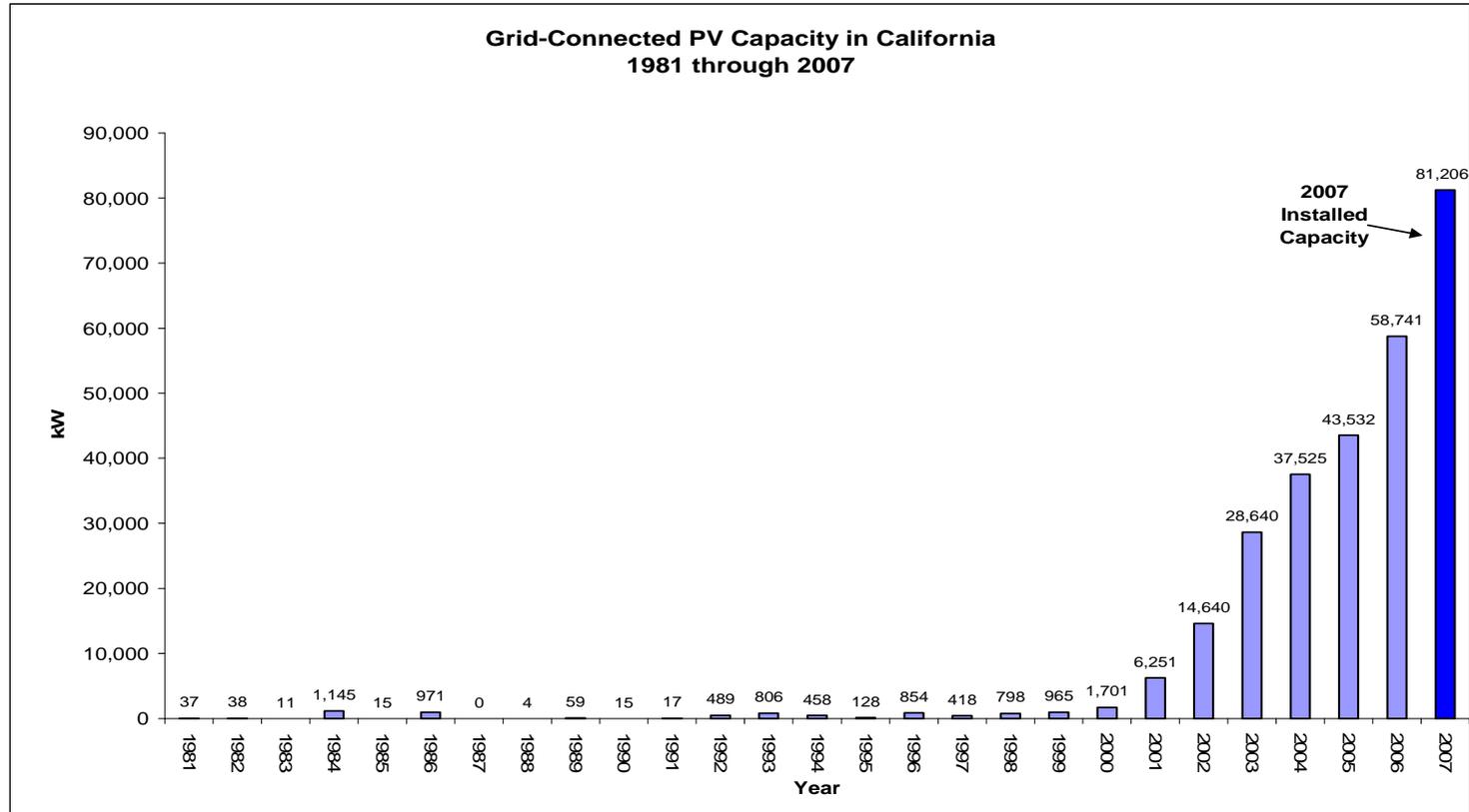


CSI Program Components, 2007-2016

Program Authority	California Public Utilities Commission	California Energy Commission	Publicly Owned Utilities (POU)
Budget	\$2,167 million	\$400 million	\$784 million
Solar Goals (MW)	1,940 MW	360 MW	700 MW
Scope	All systems in IOU areas <u>except</u> new homes	New homes in IOU territories	All systems in POU areas



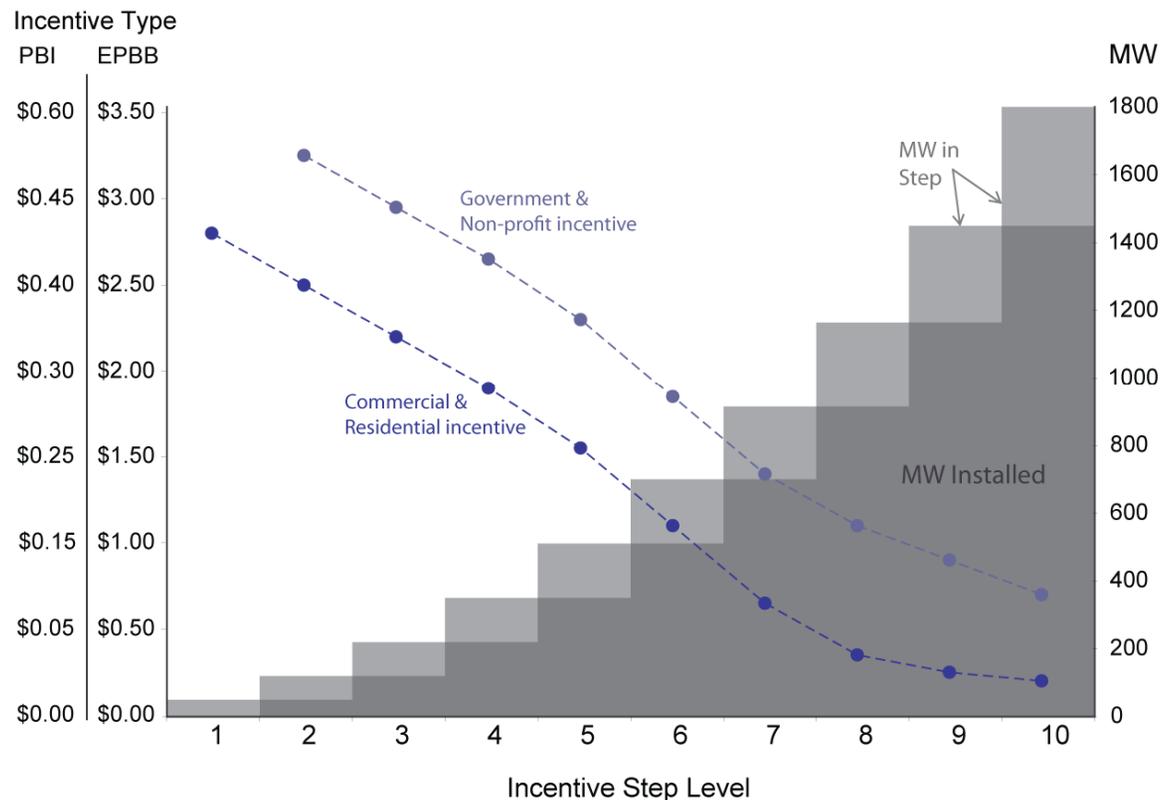
CA has 280 MW of Grid-Tied PV at 32,000 solar installations statewide



Source: 1981-2007 data from California Energy Commission's *Grid Connected PV Capacity Installed in California*, April 1, 2008. Available at:
http://energy.ca.gov/renewables/emerging_renewables/GRID_CONNECTED_PV_12-31-07.XLS.



CSI Incentives Decline as the Solar Market Continues to Grow



PBI: Performance Based Incentive, paid over 5 years, in \$ / kWh
 EPBB: Expected Performance Based Buydown, paid upfront, in \$ / W



Demand for CPUC CSI program through 3/31/2008



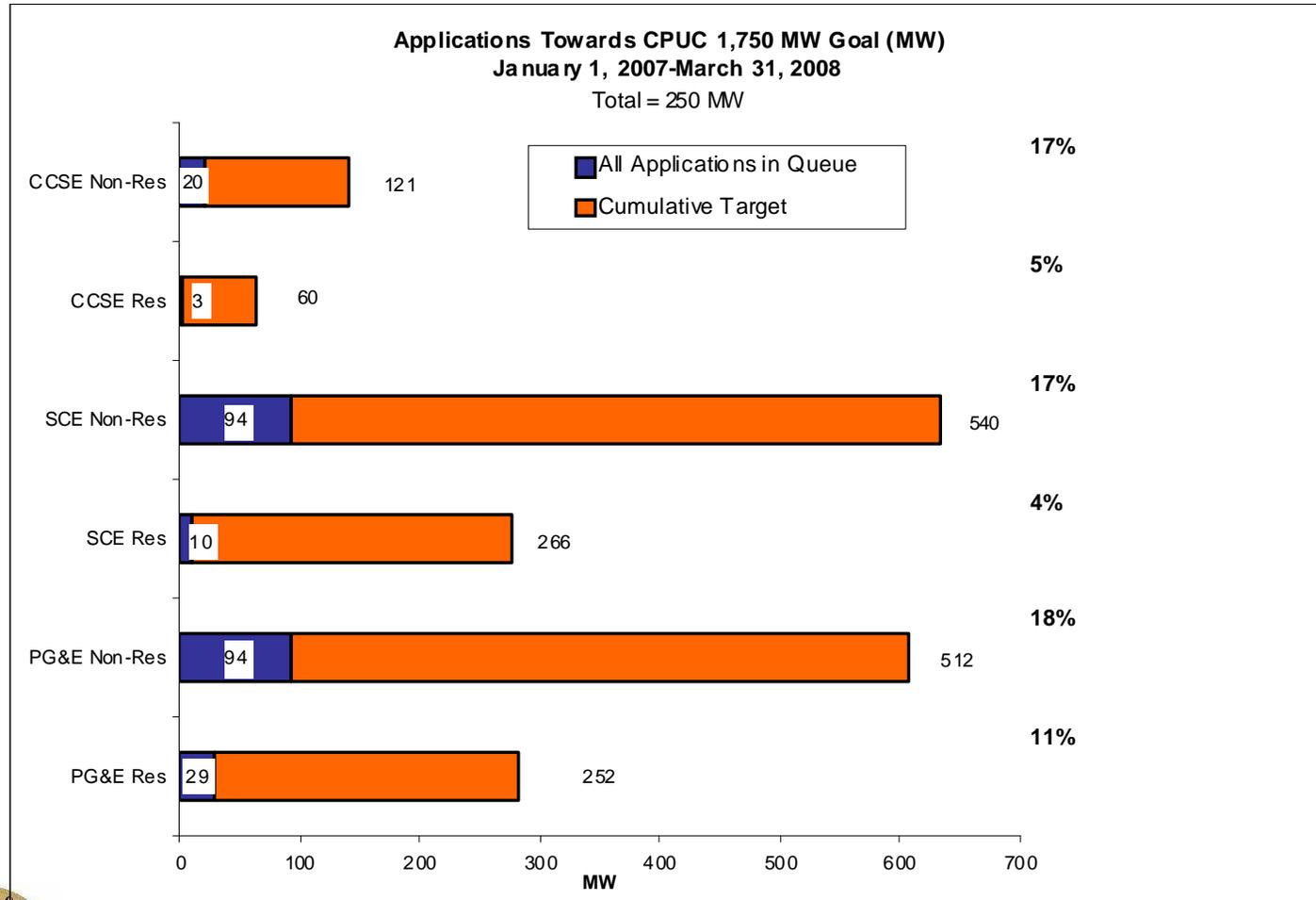
Photo: Travis Richardson, Hansen Trout Farm; Fillmore, CA.
105 kW California Solar Initiative Funded System, June 2007,
Installer: GW Richardson Heating & Air Conditioning, Inc.
Engineer/Designer: Kris Sutton, Travis Richardson

- Capacity of CSI Applications
 - 41.7 MW Residential
 - 207.5 MW Non-Residential
 - **249.3 MW Total**
 - (33.4 MW Installed)

- Number of Applications
 - 8,786 Residential
 - 1,031 Non-Residential
 - **9,817 Total**
 - (2,719 Completed)



Making Progress Towards CPUC's 2016 Goal of 1750 MW



Other CSI Program Components

- Research Development, Deployment and Demonstration (RD&D)
 - CPUC Adopted in September 2007
 - Energy Division working to get a Program Manager selected
- Low-income incentive programs
 - Single Family Program Adopted in November 2007
 - Energy Division working to get a Program Manager selected for Single Family Program
 - Multifamily Low-Income Program Under Development
- Solar Hot Water Pilot Program
 - Program Launched in July 2007
 - Will inform future implementation of AB 1470 (Huffman, 2007)



Photo: Brian Peterson, Sierra Nevada Brewing Company, Chico, CA
California Solar Initiative Funded System, 1,258 kW, September 2007
Installer: Chico Electric



Feed-in-Tariffs (FiT)

□ What is a feed-in-tariff?

- Standard offer contract for the sale of energy from a qualifying DG facility to the utility grid
- CA experience with FiT - Qualifying Facilities (QFs)
 - Public Utilities Regulatory Policy Act (PURPA) of 1978 established QFs and outlined their payment according to the avoided cost of power
 - QF is defined as non-utility generator with less than 80 MW capacity that utilizes cogeneration and/or renewable fuels (for bioenergy, \geq 50% biomass)
 - CA IOUs have more than 6,000 MW under QF contracts
 - In D. 07-09-040, CPUC adopted QF policy, pricing terms and conditions for existing and new QF facilities

□ New CA feed-in-tariffs

- AB 1969 (Yee, 2006) – Renewable FiT, under 1.5 MW
- AB 1613 (Blakeslee, 2007) – CHP FiT, under 20MW



AB 1969 (Yee, 2006)

Renewable Feed-in-Tariff

- ❑ Feed-In tariff for Public Water/Wastewater facilities
 - CPUC voluntary expansion required SCE and PG&E to offer the FiT to all facilities
 - CPUC considering expansion to SDG&E and other IOUs
- ❑ Eligibility:
 - All *renewable* DG up to 1.5MW
- ❑ Statewide cap of 478.4 MW
 - 250 MW statewide cap for public water/wastewater facilities
 - 228.4 MW cap for all other facilities in PG&E and SCE territories
- ❑ Fixed price is determined by Market-Price Referent (MPR), adjusted for time of delivery and season
- ❑ Contract periods of 10, 15 and 20 years
- ❑ Tariffs transfer Renewable Energy Certificates (RECs) from generator to utility and count as utility procurement towards Renewable Portfolio Standard (RPS)
- ❑ Two options under tariff (depending on customer's choice):
 - Full sale of production
 - Excess sales (after onsite usage)
- ❑ *Available now to customers*
- ❑ Implementation of AB 1969 takes place in R. 06-05-027



AB 1613 (Blakeslee, 2007)

CHP Feed-in-Tariff

- ❑ Requires CPUC to adopt terms and conditions for utility procurement of Combined Heat and Power DG via a Feed-in-Tariff
- ❑ Fixed or variable price to be determined by the CPUC
- ❑ Eligibility:
 - CHP up to 20MW
 - CHP systems must be sized to meet customer's thermal load. There is no requirement that CHP systems be sized to the customer's electric load. Thus, oversized systems (from an electric perspective) are permitted.
 - Only new CHP systems (installed after January 1, 2008) are eligible.
- ❑ CPUC expects to open new rulemaking to establish pricing, terms and conditions



Order Instituting Rulemaking (OIR) and Rulemaking (R) 08-03-008

- ❑ On March 17, 2008, the Commission released an OIR (R. 08-03-008) to continue the work on DG
- ❑ Scoping memo lists major policy issue areas to be considered in 2008 and beyond;
 - California Solar Initiative
 - Self-Generation Incentive Program
 - Non-utility procurement DG programs
 - Other DG issues
 - Rule 21
 - DG cost-benefit methodology
- ❑ R. 08-03-008 will not consider AB 1613 FiT or new incentives for CHP not currently included in SGIP
- ❑ Future big policy issues
 - ❑ Dozens of bills in legislature on Distributed Generation
 - ❑ Implementation of new Solar Hot Water program, new CHP feed-in tariff, inclusion of storage and other new technologies



Back up slides



CSI Low Income Programs

Single-Family Low Income Program (\$108 million budget):

- Established by Commission decision November 2007
- Provides fully subsidized 1kW systems to applicants who qualify
- Provides higher incentives to other low income households, according to tax liability:

Federal Income Tax Liability	Qualifying Low-Income CARE-Eligible Homeowners	Qualifying Low-Income Homeowners not eligible for CARE
\$0	\$7.00	\$5.75
\$1 to \$1000	\$6.50	\$5.25
\$1001 to \$2000	\$6.00	\$4.75

- CPUC is in the process of selecting a statewide Program Manager: Request For Proposals issued 4/08
- Incentives will not be available until after the Program Manager is selected

Multi-Family Affordable Housing Program (\$108 million budget):

- Multifamily Affordable Housing Program is currently under development
- February 2008: Energy Division staff issued a proposal on the program
 - A workshop was held in March 2008
 - Comments filed in early April
- The CPUC is currently considering comments: next step is a proposed decision

