

# Webinar Basics

1. You must dial in on a phone line to hear the audio portion of this webinar. Please refer to your webinar registration confirmation for the dial in instructions.
2. The handouts for this webinar were emailed this morning to the email address used to register for this webinar. They are also available online at [www.cashnet.org/meetings](http://www.cashnet.org/meetings).
3. We will hold questions and answers to the end of the webinar. Please use the dialogue box on the left side of the screen to enter your questions throughout the webinar.
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## The Energy Landscape in California and Opportunities for Lowering M&O Expenditures

*Presented by:*  
Russell Driver  
Newcomb | Anderson | McCormick  
San Francisco  
February 3, 2009

*Presented to...*



CALIFORNIA'S  
COALITION  
*for* ADEQUATE  
SCHOOL HOUSING<sup>SM</sup>



## Agenda

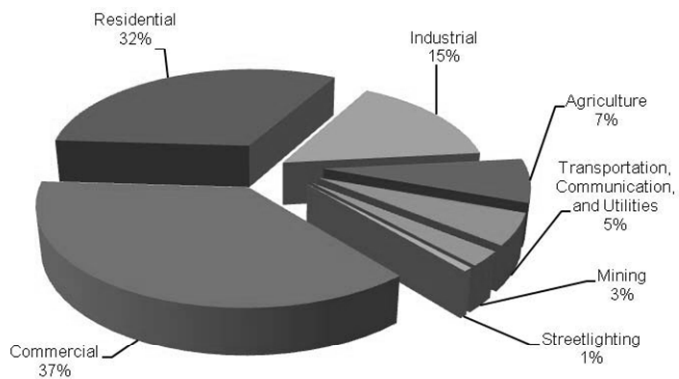
- Welcome and Introductions
- California Energy Industry Basics
- Energy Efficiency in California
- Solar Opportunities in California
- Q&A

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## Californians Consumed 286,000 GWh in 2008



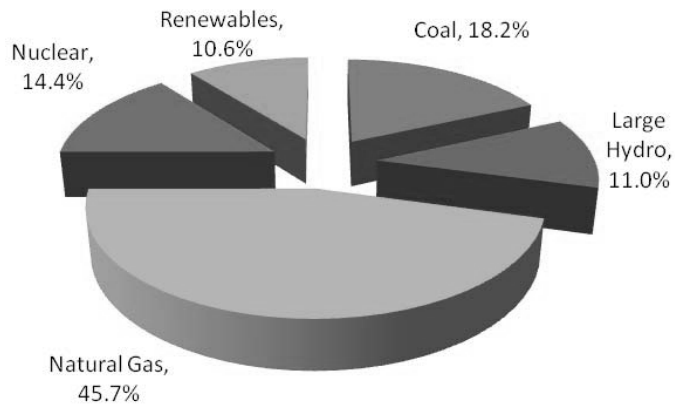
Source: California Energy Commission

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## Generation Mix Dominated by Natural Gas



Source: California Energy Commission

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## CA Energy Industry Key Players

- Four Investor Owned Utilities (IOU)
  - PG&E, SCE, SDG&E, SCG
- Numerous Publicly Owned (Municipal) Utilities
- Regulators
  - CPUC – California Public Utilities Commission: Regulates IOUs
  - CEC - California Energy Commission: Policy, Planning, Forecasting, Licensing

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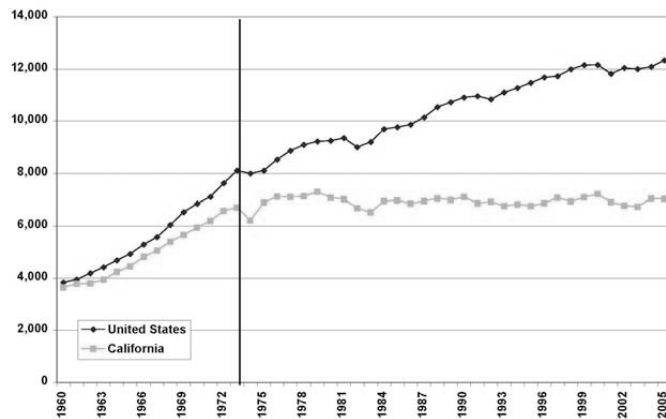
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## Energy Efficiency: CA's Highest Priority Resource

Per Capita Electricity Sales in Kilowatt Hours per Person



Source: California Energy Commission

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## Why Energy Efficiency?

- Reduce energy supply costs and lower bills
- Maintain reliability
- Reduce price volatility
- Protect environment – reduce pollution and greenhouse gas
- Contribute to water savings

## Comprehensive Policy and Regulatory Framework

- Energy Action Plans I and II – coordinated implementation for state policies
- Long-Term Energy Efficiency Strategic Plan
- Minimum building and appliance efficiency standards
- “Loading Order”: efficiency first
- Energy savings goals for IOUs
- Decoupling of IOU revenues from sales volume
- Public Goods Charge collected from all customers to fund EE programs

## Types of Energy Efficiency Incentive Programs

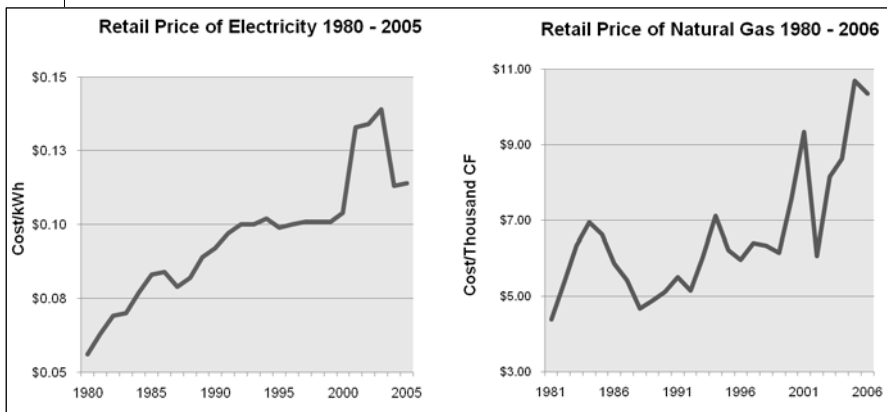
- Retrocommissioning
  - Low cost/no cost
  - Controls and set points
  - Behavior changes
- Retrofit
  - Equipment upgrades
  - Systems projects
  - Process-related
- New Construction
  - Includes gut rehab
  - Systems
  - Whole building
- Demand Reduction
  - Incentives for shedding peak demand

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## The Cost of Doing Nothing



Source: California Energy Commission

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- ***Solar Opportunities in California***
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## The Solar Industry in California

- CA has the largest, strongest and most mature solar PV market in the US with 550 MW of installed capacity
- Diversified installer base tapping in the global PV equipment market
- Supportive regulatory environment with Net Metering, California Solar Initiative and other programs in addition to Federal incentives

## Relevant Solar Programs

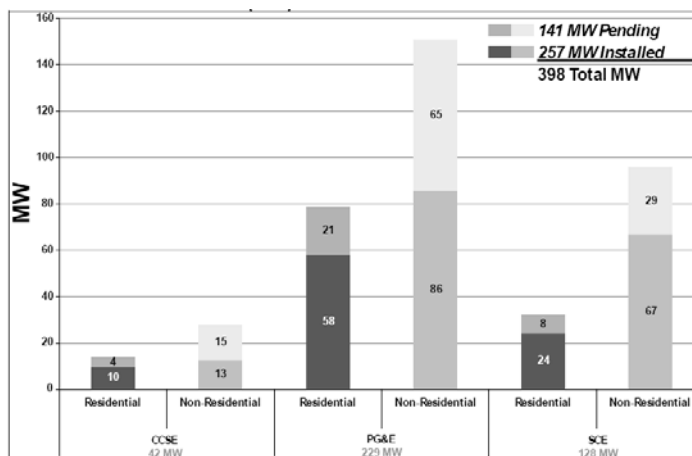
- California Solar Initiative (CSI)
  - The California Solar Initiative provides cash back for installing solar for existing homes, commercial, industrial, government, non-profit, and agricultural properties
  - The current incentive rate for government projects is \$026 per kWh generated
- Net Energy Metering
  - Energy generated by the PV system is used to offset the customer's electricity bill
  - A "net meter" is installed to measure the difference between electricity supplied to the customer by PG&E and electricity the customer exports to the grid
  - Charges and credits are reconciled after 12 monthly billing periods
  - Eligible for CSI incentives
- Feed-In Tariffs
  - the energy produced by the PV system in excess of the customer load is purchased by PG&E at a predetermined rate
  - system size is limited to 1.5 megawatts
  - Not eligible for CSI
- "Virtual" Net Energy Metering (AB 2466)
  - AB2466 allows a local government (including school districts) to install renewable generation at one location within its geographic boundary and generate credits that can be used to offset charges at one or more other locations
  - Policy regarding CSI eligibility under development

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## Capacity of Pending and Installed CSI Applications



Source: [www.CaliforniaSolarStatistics.ca.gov](http://www.CaliforniaSolarStatistics.ca.gov), September 30, 2009.

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## Solar Incentives Under CSI

- The California Solar Initiative has a budget of \$2,167 million over 10 years, and the goal is to reach 1,940 MW of installed solar capacity by 2016
- Incentives for large systems (over 10 kW) are provided for the energy generated over the first five years the system is operational
- Currently, the incentive for schools is \$0.26 per kWh in the PG&E service area and \$0.32 in the SCE service area
- Incentive rates decline over time, depending on the quantity of solar installed

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## Current Incentive Status

- Current incentive levels can be found on the Trigger Tracker website: <http://www.csi-trigger.com/>

California Solar Initiative Statewide Trigger Point Tracker									
Last updated 1/29/2010									
Administrator	Customer Class *	Current Step	Initial MW In Step	Unused MW from Previous Steps	Revised Total MW In Step	Issued Conditional Reservation Letters (MW)	MW Remaining	MW Under Review	
PG&E	Residential	6	27.40	0.85	28.25	14.71	13.54	0.59	
	Non-Residential	6	55.60	22.42	78.02	27.43	50.59	6.55	
SCE	Residential	4	19.70	1.15	20.85	11.36	9.50	2.00	
	Non-Residential	5	49.30	32.06	81.36	39.61	41.74	8.46	
CCSE	Residential	6	6.50	0.06	6.56	2.46	4.10	0.31	
	Non-Residential	6	13.10	0.28	13.38	5.85	7.53	2.39	

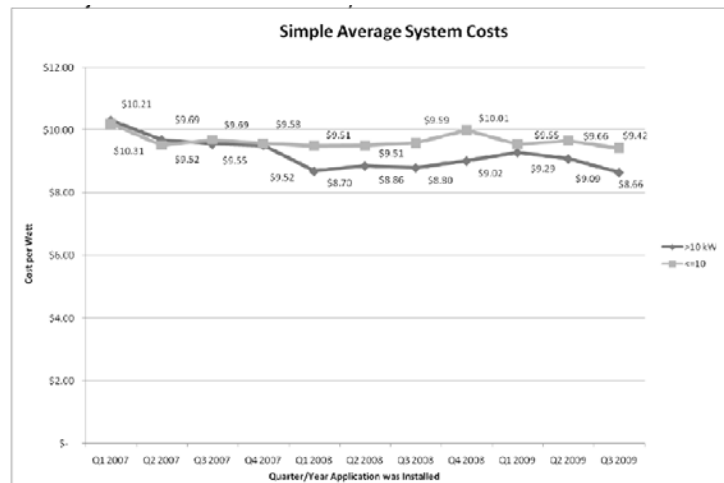
Step	Statewide MW In Step	EPDB Payments (per Watt)			PBI Payments (per kWh)		
		Residential	Non-Residential		Residential	Non-Residential	
			Commercial	Government/Non-Profit		Commercial	Government/Non-Profit
1	50	n/a	n/a	n/a	n/a	n/a	n/a
2	70	\$2.50	\$2.50	\$3.25	\$0.39	\$0.39	\$0.50
3	100	\$2.20	\$2.20	\$2.95	\$0.34	\$0.34	\$0.46
4	130	\$1.90	\$1.90	\$2.65	\$0.26	\$0.26	\$0.37
5	160	\$1.55	\$1.55	\$2.30	\$0.22	\$0.22	\$0.32
6	190	\$1.10	\$1.10	\$1.85	\$0.15	\$0.15	\$0.26
7	215	\$0.65	\$0.65	\$1.40	\$0.09	\$0.09	\$0.19
8	250	\$0.35	\$0.35	\$1.10	\$0.05	\$0.05	\$0.15
9	285	\$0.25	\$0.25	\$0.90	\$0.03	\$0.03	\$0.12
10	350	\$0.20	\$0.20	\$0.70	\$0.03	\$0.03	\$0.10

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## The Cost of Solar is Declining



Source: Chart data was derived from the filtered data set on [www.CaliforniaSolarStatistics.ca.gov](http://www.CaliforniaSolarStatistics.ca.gov), September 30, 2009. The data is derived from simple \$/watt averages on a per-project basis, listed in nominal dollars.

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## Key Considerations for Solar Projects

- Several considerations have a significant effect on the viability of a potential solar project.
  - The price of energy purchased from PG&E and annual escalation rate
  - The amount of energy consumed and the profile of that consumption
  - The total lifecycle cost of the solar system, including operations and maintenance
  - PPA rates

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## Newcomb|Anderson|McCormick – Firm Overview

- 18 full-time, San Francisco-based energy professionals including 4 Program Managers
- Successfully designed, developed and implemented programs, policies and projects to enable clients to achieve their sustainability and energy goals
- Deep industry experience exclusively in Professional Energy Management Activities
- Focus on energy efficiency and renewables programs
- Over \$300 million in annual energy savings as a result of our efforts



# THE PATH TO “GREEN”

ONE STEP AT A TIME....




Presented by:  
Steven Plaxco  
Director of Maintenance and Facilities  
Yuba City Unified School District


## GREEN CONCERNS FOR M&O

- ◆ M&O is a key stakeholder – “Green” cannot succeed without M&O support!
- ◆ M&O *must* be part of the planning process.
- ◆ M&O is a crucial partner, particularly when investigating design needs at existing school sites.
- ◆ M&O must be provided the resources and training necessary to operate and maintain the energy systems.

## STARTING THE GREEN GARDEN

- ◆ Start small to ensure success...then build upon that success.
  - ◆ Test the "soil" (baseline).
  - ◆ Fertilize (educate the end user and gain support).
  - ◆ Plant and watch it grow!
  - ◆ Enjoy the fruits of your labor!!
- 

## DEVELOP THE BASELINE

- ◆ How are you doing now?
  - ◆ Review past energy usage.
  - ◆ Use your energy provider as a resource:  
PGE Portfolio Manager  
<http://www.pge.com/benchmarking>
  - ◆ CHPS Operations Report Card  
<http://www.chps.net/dev/Drupal/node/44>
- 

# ASSESS YOUR SCHOOLS

- ◆ Perform an energy audit to determine improvements with quick payback potential...lamp retrofits, energy management controls, etc.
- ◆ California Energy Commission Bright Schools Program audits available at NO COST!! (up to 200,000 s.f.)

<http://www.energy.ca.gov/efficiency/brightschoools>

## COST AVOIDANCE

Relamping energy savings for 476,000 sf

Year	Program Savings				Annual Gross Savings	Debt Service	Cashflow
	Energy	Operational	Construction*	Rebate			
0	\$ -	\$ -	\$ 50,000	\$ -	\$ 50,000	\$ 0	\$ 50,000
1	\$ 95,973	\$ 7,800	\$ -	\$ 35,700	\$ 139,473	\$(104,940.72)	\$ 34,532
2	\$ 98,852	\$ 8,034	\$ -	\$ -	\$ 108,886	\$(104,940.72)	\$ 1,945
3	\$ 101,818	\$ 8,275	\$ -	\$ -	\$ 110,093	\$(104,940.72)	\$ 5,152
4	\$ 104,872	\$ 8,523	\$ -	\$ -	\$ 113,396	\$(104,940.72)	\$ 8,455
5	\$ 108,018	\$ 8,779	\$ -	\$ -	\$ 116,797	\$(104,940.72)	\$ 11,857
6	\$ 111,259	\$ 9,042	\$ -	\$ -	\$ 120,301	\$(104,940.72)	\$ 15,361
7	\$ 114,597	\$ 9,314	\$ -	\$ -	\$ 123,910	\$(104,940.72)	\$ 18,970
8	\$ 118,035	\$ 9,593	\$ -	\$ -	\$ 127,628	\$(104,940.72)	\$ 22,687
9	\$ 121,576	\$ 9,881	\$ -	\$ -	\$ 131,457	\$(104,940.72)	\$ 26,516
10	\$ 125,223	\$ 10,177	\$ -	\$ -	\$ 135,400	\$(104,940.72)	\$ 30,460
11	\$ 128,980	\$ 10,483	\$ -	\$ -	\$ 139,462	\$ 0	\$ 139,462
12	\$ 132,849	\$ 10,797	\$ -	\$ -	\$ 143,646	\$ 0	\$ 143,646
13	\$ 136,835	\$ 11,121	\$ -	\$ -	\$ 147,955	\$ 0	\$ 147,955
14	\$ 140,940	\$ 11,455	\$ -	\$ -	\$ 152,394	\$ 0	\$ 152,394
15	\$ 145,168	\$ 11,798	\$ -	\$ -	\$ 156,966	\$ 0	\$ 156,966
<b>Total</b>	<b>\$ 1,784,994</b>	<b>\$ 145,072</b>	<b>\$ 50,000</b>	<b>\$ 35,700</b>	<b>\$ 2,015,765</b>	<b>\$(1,049,407)</b>	<b>\$ 966,358</b>

Total Project Cost	\$ 873,823
Financing Rate	3.45%
Energy Savings Escalation	3.00%
Operational Savings Escalation	3.00%

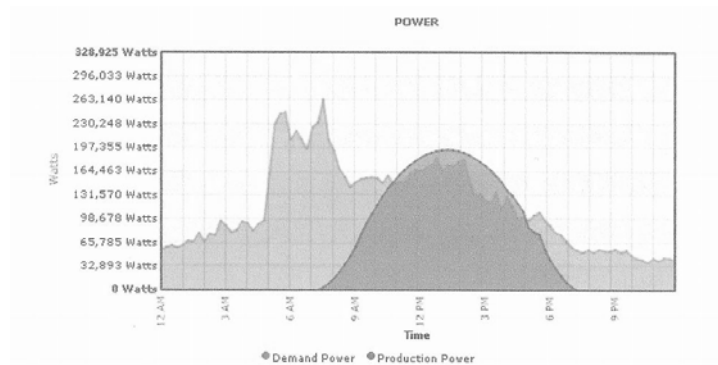
## HARVEST THE SUN!

- ◆ Photovoltaic (solar) power works!
- ◆ YCUSD owned 300 KW plant installed at 86,000+ s.f. K-8 campus provides up to 50% of energy over the year.
- ◆ Maintenance cost expended for past 4 years is minimal (washing panels).
- ◆ Thin-film panels built into roofing system are almost indestructible.
- ◆ Electrical cost averages \$0.10 per KWh versus \$0.20 at non-solar campus.

## RIVERBEND SCHOOL - YCUSD



# TYPICAL SOLAR OUTPUT



Electricity Consumed by this facility	<b>33,846.10 kWh</b>
Electricity (Units) <b>produced</b> by Solar System	<b>32,412.10 kWh</b>
'Net' Electricity <b>purchased from</b> utility company so far today	<b>1,434.00 kWh</b>
<b>DAILY ENERGY USAGE</b>	
Peak Power used by facility	<b>299.25 kW</b>
Peak Power produced by Solar System so far today	<b>196.19 kW</b>
Peak Power provided by utility so far today	<b>297.18 kW</b>

## WHAT ABOUT PPA's?

- ◆ Power Purchase Agreements
- ◆ Solar provider pays for system installation at no cost to district.
- ◆ District agrees to purchase solar generated power at reduced price for a set term.
- ◆ Solar provider owns and maintains plant.

# TYPICAL PPA COST AVOIDANCE

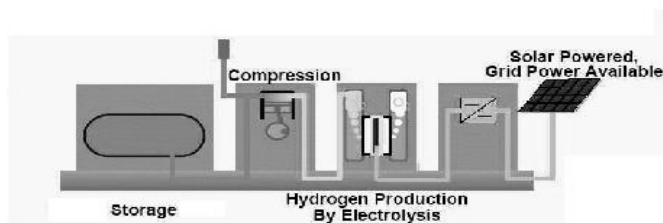
River Valley High School - River Valley HS East

Utility Information		System Information		PPA Information	
Utility:	PGE	System Size:	657 kW DC	PPA Rate:	\$0.1750
Meter Number:	5P2508	System Type:	Fixed	PPA Escalator:	3.50%
Current Tariff:	E-19 S	Production Y1:	958,997 kWh	Term Length:	20 Years
Proposed Tariff:	A-6	Annual Degradation:	0.50%	Utility Escalator:	4.50%

Year	Utility Bill (No Solar)	SPP Bill	Remaining Utility Bill	Combined Utility & SPP Bill	Forecasted Annual Savings	Forecasted % Annual Savings
1	\$256,612	\$167,825	\$76,248	\$244,073	\$12,540	4.89%
2	\$268,160	\$172,830	\$80,690	\$253,520	\$14,640	5.46%
3	\$280,227	\$177,985	\$85,373	\$263,358	\$16,870	6.02%
4	\$292,837	\$183,293	\$90,308	\$273,601	\$19,236	6.57%
5	\$306,015	\$188,760	\$95,509	\$284,268	\$21,747	7.11%
6	\$319,786	\$194,389	\$100,988	\$295,378	\$24,408	7.63%
7	\$334,176	\$200,187	\$106,762	\$306,949	\$27,227	8.15%
8	\$349,214	\$206,158	\$112,844	\$319,001	\$30,213	8.65%
9	\$364,929	\$212,306	\$119,250	\$331,557	\$33,372	9.14%
10	\$381,350	\$218,638	\$125,998	\$344,637	\$36,714	9.63%
				<b>TOTAL 10 YEARS</b>	<b>\$236,966</b>	
11	\$398,511	\$225,159	\$133,105	\$358,264	\$40,247	10.10%
12	\$416,444	\$231,875	\$140,588	\$372,462	\$43,982	10.56%
13	\$435,184	\$238,790	\$148,467	\$387,257	\$47,927	11.01%
14	\$454,767	\$245,912	\$156,763	\$402,675	\$52,092	11.45%
15	\$475,232	\$253,247	\$165,496	\$418,743	\$56,489	11.89%
				<b>TOTAL 15 YEARS</b>	<b>\$477,703</b>	
16	\$496,617	\$260,800	\$174,689	\$435,489	\$61,128	12.31%
17	\$518,965	\$268,578	\$184,366	\$452,944	\$66,022	12.72%
18	\$542,319	\$276,588	\$194,549	\$471,138	\$71,181	13.13%
19	\$566,723	\$284,838	\$205,267	\$490,104	\$76,619	13.52%
20	\$592,226	\$293,333	\$216,544	\$509,877	\$82,349	13.90%
				<b>TOTAL 20 YEARS</b>	<b>\$835,002</b>	

## WHAT THE FUTURE HOLDS

- ◆ Geothermal Heat Pumps
- ◆ Thermal Energy Storage (Ice Bank)
- ◆ Wind Generators
- ◆ Hydrogen Generators/Fuel Cells
- ◆ Solar Vacuum Tubes w/Absorption HVAC



# RESOURCES

<http://www.dsa.dgs.ca.gov/OtherProg/workgroup>

<http://www.dsa.dgs.ca.gov/OtherProg/gridneutral>

## Questions or Comments?

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